(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 829 813 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.01.2015 Bulletin 2015/05

(51) Int Cl.:
F24F 11/00 *(2006.01)* ***H02J 13/00*** *(2006.01)*
H04N 21/41 *(2011.01)*

(21) Application number: **14177952.0**

(22) Date of filing: **22.07.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **22.07.2013 KR 20130086303**

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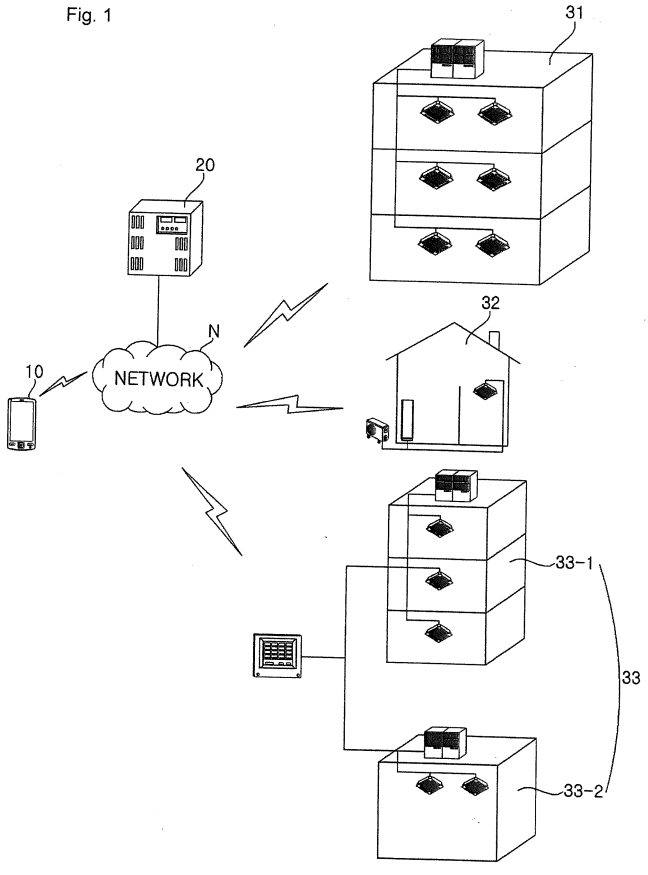
(54) Air conditioner and method of controlling the same

(57) An air conditioner and a method of controlling the same are disclosed. The air conditioner includes a plurality of units and a plurality of air conditioner sites including a plurality of units. Control setting having at least one unit as a control device is created irrespective of an installation position and a connection state of each unit such that the control setting is immediately applied or application of the control setting is released through simple manipulation, thereby easily and rapidly monitoring and controlling operation of the air conditioner in a remote fashion.

Fig. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] The present invention relates to an air conditioner and a method of controlling the same and, more particularly, to an air conditioner that is capable of easily controlling operations of a plurality of air conditioner units using a terminal and a method of controlling the same.

2. Description of the Related Art

[0002] An air conditioner is installed to discharge hot air or cool air into a room, thereby creating a comfortable indoor environment, adjusting the temperature of the room, and purifying air in the room. In general, the air conditioner includes an indoor unit, constituted by a heat exchanger, installed in the room and an outdoor unit, constituted by a compressor and a heat exchanger, to supply refrigerant to the indoor unit.

[0003] In the air conditioner, the indoor unit constituted by the heat exchanger and the outdoor unit constituted by the compressor and the heat exchanger are separately controlled. The supply of electric power to the compressor or the heat exchanger is controlled to operate the air conditioner. In addition, the air conditioner may be configured such that at least one indoor unit is connected to a single outdoor unit. According to a requested operation state, refrigerant is supplied to the indoor unit such that the air conditioner is operated in a cooling mode or in a heating mode.

[0004] The air conditioner performs a cooling operation or a heating operation based on flow of the refrigerant. During the cooling operation, high-temperature, high-pressure liquid refrigerant is supplied from the compressor of the outdoor unit to the indoor unit via the heat exchanger of the outdoor unit. The high-temperature, high-pressure liquid refrigerant is expanded by the heat exchanger of the indoor unit. As a result, the refrigerant is evaporated to lower the temperature of air around the heat exchanger of the indoor unit. An indoor unit fan is rotated to discharge cool air into the room. During the heating operation, on the other hand, high-temperature, high-pressure gaseous refrigerant is supplied from the compressor of the outdoor unit to the indoor unit. The high-temperature, high-pressure gaseous refrigerant is liquefied by the heat exchanger of the indoor unit. At this time, air heated by energy emitted from the refrigerant is discharged into the room according to operation of the indoor unit fan.

[0005] In a case in which a plurality of indoor units connected to a single outdoor unit, in a case in which a plurality of outdoor units is connected to each other, in a case in which a plurality of units, such as a ventilation unit and a heat pump, is connected to each other, or in a case in which a plurality of air conditioner sites is connected to each other, the above-mentioned units are integrally managed through an additional central control device.

[0006] Conventionally, the central control device groups a plurality of units or divides the units into predetermined zones such that the central control device controls the units on a per group basis or on a per zone basis. However, formation and change of the groups or the zones and addition of a new group or a new zone is performed by only the central control device, which is inconvenient.

[0007] In addition, a plurality of units may be controlled through access to the central control device using a terminal. However, a control range is limited. Furthermore, an object to be controlled is selected through a complex menu, which is troublesome and inconvenient.

SUMMARY OF THE INVENTION

[0008] It is an object of the present invention to provide an air conditioner including a plurality of units wherein the units are arbitrarily grouped irrespective of a connection state of the units to easily and rapidly control operations of the units in a remote fashion and a method of controlling the same.

[0009] In accordance with an aspect of the present invention, the above and other objects can be accomplished by the provision of an air conditioner including a plurality of units installed at a plurality of areas in a decentralized fashion, a plurality of air conditioner sites including the units per area, and a terminal accessing the units and the air conditioner sites to monitor operation states of the units and the air conditioner sites and control operations of the units and the air conditioner sites, wherein the terminal sets at least one of the units as an object to be controlled, i.e. a control device, irrespective of installation positions and connection states of the units, sets and stores at least one control setting including a control command for the control device, and applies the control setting or releases application of the control setting using one button such that the units set as the control device are simultaneously operated according to the control command.

[0010] In accordance with another aspect of the present invention, there is provided a method of controlling an air conditioner performed by a terminal including accessing a plurality of units and a plurality of air conditioner sites including the units to receive operation information by executing a program provided in the terminal, displaying at least one control setting to control the units and the air conditioner sites together with the operation information as a list, immediately applying a control command to at least one unit set as a control device or releasing application of the control command for any one control setting selected from the control setting list, and transmitting the control command to the control device corresponding to the control setting to control operation of the control device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a view showing the construction of an air conditioner system according to the present invention;

FIG. 2 is a view showing a communication flow of the air conditioner system according to the present invention using a terminal;

FIG. 3 is a block diagram showing the construction of each unit of an air conditioner according to the present invention;

FIG. 4 is a block diagram showing the construction of a terminal to control each unit of the air conditioner according to the present invention; and

FIGS. 5 to 12 are views illustrating various embodiments of controlling a plurality of units constituting a plurality of air conditioners using the terminal in the air conditioner system according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Advantages and features of the present invention and a method of achieving the same will be more clearly understood from embodiments described below with reference to the accompanying drawings. However, the present invention is not limited to the following embodiments but may be implemented in various different forms. The embodiments are provided merely to complete disclosure of the present invention and to fully provide a person having ordinary skill in the art to which the present invention pertains with the category of the invention. The invention is defined only by the category of the claims. Wherever possible, the same reference numbers will be used throughout the specification to refer to the same or like elements.

[0013] Hereinafter, reference will now be made in detail to embodiments, examples of which are illustrated in the accompanying drawings.

[0014] FIG. 1 is a view showing the construction of an air conditioner system according to the present invention.

[0015] As shown in FIG. 1, the air conditioner system includes air conditioner sites 31, 32, and 33, each of which is constituted by at least one unit including an outdoor unit (not shown) and an indoor unit (not shown), a server 20 connected to the air conditioner sites 31, 32, and 33 over a predetermined network N, and a terminal to access the air conditioner sites 31, 32, and 33 and the server 20 over the network N.

[0016] Each of the air conditioner sites 31, 32, and 33 includes at least one unit to constitute an air conditioner network in each of the air conditioner sites 31, 32, and 33. In addition, the air conditioner sites 31, 32, and 33 are connected to one another to constitute another air conditioner network.

[0017] Each of the air conditioner sites 31, 32, and 33 includes a controller to control and monitor operation of each unit in each of the air conditioner sites 31, 32, and 33. Each of the air conditioner sites 31, 32, and 33 may transmit data regarding an operation state of each unit in each of the air conditioner sites 31, 32, and 33 to the server 20 and the terminal 10 over the network N and, in addition, variably control the operation of each unit in each of the air conditioner sites 31, 32, and 33 according to a control signal received from the server 20 or the terminal 10.

[0018] Each of the air conditioner sites 31, 32, and 33 may further include a ventilation unit, an air purification unit, a humidification unit, a dehumidification unit, or a heater in addition to the outdoor unit and the indoor unit. The air conditioner sites 31, 32, and 33 may include different types and numbers of units.

[0019] The network N includes network access, such as the Internet, in addition to the air conditioner network. Both wired and wireless communication modes may be used.

[0020] The server 20 stores basic data regarding the air conditioner sites 31, 32, and 33 and data regarding operation states received from the air conditioner sites 31, 32, and 33. The basis data include the number, types, and capacities of units constituting each of the air conditioner sites 31, 32, and 33 and address information for data transmission and reception. The operation state data are updated at predetermined time intervals.

[0021] The server 20 authorizes the terminal 10, which controls each unit of each of the air conditioner sites, to register the terminal and to control each unit of each of the air conditioner sites. In addition, the server 20 authenticates access to the terminal and, when operation of each unit of each of the air conditioner sites is changed according to control of the terminal 10, stores data regarding the changed operation of each unit of each of the air conditioner sites.

[0022] In addition, the server 20 provides a program necessary for the terminal 10 to access each of the air conditioner sites and each unit of each of the air conditioner sites and manages update of the program.

[0023] The terminal 10 accesses the server 20 using a program installed therein over the network N to register the terminal 10 and is given an authority to access each unit of each of the air conditioner sites such that the terminal 10 accesses at least one air conditioner site to control operation of at least one unit of the at least one air conditioner site.

[0024] The terminal 10 groups the units included in the air conditioner sites based on the types and positions of the units to control and monitor operation of the grouped units.

[0025] In addition, the terminal 10 may not only group a plurality of units included in each air conditioner site to

control operation of the grouped units but also group a plurality of units included in different two or more air conditioner sites to control operation of the grouped units.

[0026] FIG. 2 is a view showing a communication flow of the air conditioner system according to the present invention using the terminal.

[0027] Referring to FIG. 2, the terminal 10 controls operation of each unit of the air conditioner system and a plurality of units included in each of the air conditioner sites based on the types and forms of the units.

[0028] The terminal 10 accesses the server 20 to transmit and receive data to and from the server 20. In addition, the terminal 10 controls an outdoor unit 50, an indoor unit 40, and a ventilation unit 60. In addition, the terminal 10 may monitor and control operation of other units, such as a heat pump, a heater, an air purification unit, a humidification unit, and a dehumidification unit, included in each of the air conditioner sites.

[0029] Of the units included in each of the air conditioner sites, the indoor unit 40 includes an expansion valve (not shown) to expand refrigerant received from the outdoor unit 50 connected to the indoor unit 40, an indoor heat exchanger to perform heat exchange between the refrigerant and air, an indoor unit fan (not shown) to supply indoor air to the indoor heat exchanger and to discharge heat-exchanged air into a room, a plurality of sensors (not shown), and a controller (not shown) to control operation of the indoor unit 40. The indoor unit 40 further includes a discharge port, through which the heat-exchanged air is discharged. In the discharge port is provided an air direction adjustment device to open and close the discharge port and to adjust the direction of discharged air. The indoor unit 40 controls a rotational speed of the indoor unit fan to control the amount of suctioned air and discharged air, thereby adjusting air volume. In addition, the indoor unit 40 may further include a human body sensor to sense a human body present in the room according to circumstances. Furthermore, the indoor unit 40 may further include an output unit to display an operation state and setting information of the indoor unit 40 and an input unit to input setting data.

[0030] In addition, the outdoor unit 50 operates in a cooling mode or a heating mode in response to a request of the indoor unit 40 connected to the outdoor unit 50 or a control command from an external device. The outdoor unit 50 supplies refrigerant to a plurality of indoor units. The outdoor unit 50 includes at least one compressor (not shown) to compress refrigerant introduced into the compressor and to discharge high-pressure gaseous refrigerant, an accumulator (not shown) to separate the refrigerant into gaseous refrigerant and liquid refrigerant such that unevaporated liquid refrigerant is prevented from being introduced into the compressor, an oil separator to collect oil from the refrigerant discharged from the compressor, an outdoor heat exchanger (not shown) to condense or evaporate the refrigerant through heat exchange between the refrigerant and outdoor air, an outdoor unit fan (not shown) to supply air to the outdoor heat exchanger and to discharge heat-exchanged air to the outside such that heat exchange performed by the outdoor heat exchanger is more smoothly achieved, a four-way valve (not shown) to change a refrigerant flow channel according to an operation mode of the outdoor unit 50, at least one pressure sensor (not shown) to measure pressure, at least one temperature sensor (not shown) to measure temperature, and a controller to control operation of the outdoor unit 50 and to perform communication with another unit. In addition, the outdoor unit 50 may further include a plurality of sensors, a valve, and an overcooling device, descriptions of which will be omitted.

[0031] FIG. 3 is a block diagram showing the construction of each unit of an air conditioner according to the present invention. Components of each unit of the air conditioner are commonly applied to other units of the air conditioner. Some of the components of each unit of the air conditioner may be added or omitted based on the type and form of the unit.

[0032] Referring to FIG. 3, the unit of the air conditioner includes a communication part 120, a data part 130, a drive controller 160, a sensing part 150, an input and output part 140, and a unit controller 110 to control overall operation of the unit.

[0033] The communication part 120 transmits data regarding operation and an operation state of the unit to the controller in the air conditioner site, transmits the data regarding the operation and the operation state of the unit to the server or the terminal over a predetermined network, and transmits a control signal received from the controller, the terminal, or the server to the unit controller 110.

[0034] The communication part 120 includes a wireless communication module 121 to communicate with the server 20 or the terminal 10 over the network N and an air conditioner communication module 122 to communicate with another unit or controller in the air conditioner site. The communication part 120 may perform communication in a wired or wireless communication mode. The communication part 120 may include a plurality of communication modules based on the communication mode.

[0035] The drive controller 160 controls operation of the unit according to a control command from the unit controller 110. The drive controller 160 may have different constructions based on the type of the unit. For example, the drive controller of the outdoor unit may control operation of the compressor, the valve, and the outdoor unit fan. In this case, the drive controller 160 may include a compressor drive controller, a valve drive controller, and a fan drive controller. The drive controller of the indoor unit controls operation of the indoor unit fan.

[0036] The sensing part 150 includes a plurality of sensors to measure data, such as temperature, pressure, rotational speed, voltage, and current. The sensing part 150 measures information regarding the unit inside or outside the unit through the sensors and inputs the meas-

ured information to the unit controller 110. In addition, the sensing part 150 may further include a sensing device to sense a human body present in the room according to the position at which the unit is installed.

[0037] The input and output part 140 controls data input into and data output from the unit. The input and output part 140 inputs a predetermined signal to the unit controller 110 according to manipulation of at least one button or a predetermined input device and displays predetermined data on an output part according to a control command from the unit controller 110. In this case, the input device or the output device may not be provided based on the type and form of the unit.

[0038] The data part 130 stores basic data of the unit, control data to control operation of the unit, input and output data, and data received through the communication part 120.

[0039] The unit controller 110 controls input and output data to be processed, the unit to communicate with the terminal or the server through the communication part, and the unit to perform a predetermined operation according to setting. The unit controller 110 controls the unit based on data measured or sensed by the sensing part 150 and determines whether the unit operates normally or not.

[0040] The unit controller 110 controls the unit to operate according to input operation setting or a control signal from the controller of the air conditioner site including the unit, provides data regarding the unit according to request from the server 20 or the terminal 10, and controls operation of the unit according to a received control signal.

[0041] FIG. 4 is a block diagram showing the construction of the terminal to control each unit of the air conditioner according to the present invention

[0042] Referring to FIG. 4, the terminal 10 includes a communication part 220, a speaker 260, a display part 250, an input part 240, a memory 230, and a terminal controller 210 to control overall operation of the terminal 10. In addition, the terminal 10 may further include a sensor, such as a position information sensor or an acceleration sensor, based on the form of the terminal, a description of which will be omitted.

[0043] The input part 240 includes at least one button or a touch input device. According to circumstances, the input part 240 may include both the button and the touch input device. The input part 240 transmits a user command input according to manipulation of the input device to the terminal controller 210.

[0044] The display part 250 includes a predetermined display device to output numbers, letters, special characters, or images. Alternatively, the display part 250 may include a lamp lit or blinked to output an operation state of the terminal, a connection state between the terminal and each instrument, or an alarm.

[0045] The display part 250 outputs a user command input through the input part 240 on a screen or outputs a predetermined screen corresponding to the input user command to display information regarding operation setting, operation state, and normality or abnormality of each unit of each of the air conditioner sites.

[0046] The speaker 260 outputs a predetermined effect sound or alarm sound. The predetermined effect sound or alarm sound is output under a specific condition, such as when operation starts, when the operation ends, when abnormality occurs, or when a user input is received.

[0047] The memory 230 stores setting data input through the input part 240, control data necessary to control operation of the terminal, data of each unit of each of the air conditioner sites received through the communication part 220, and data received from the server 20.

[0048] In addition, the memory 230 stores an application accessing the server or the unit to monitor or control operation of the server or the unit. The application may be downloaded from the server or another application server.

[0049] The communication part 220 includes a plurality of communication modules to transmit and receive data in a wired or wireless communication mode. For example, the communication part 220 may include a wireless communication module 221, a mobile communication module 222, and a short distance communication module 223.

[0050] The terminal 10 communicates with the server 20 and each unit of each of the air conditioner sites over the network N using the wireless communication module 221. In addition, the terminal 10 may access a mobile communication network through the mobile communication module 222 based on the type of the terminal 10 to use a voice service as well as transmission and reception of data. The short distance communication module 223 transmits and receives data within a predetermined distance using a communication mode, such as Bluetooth, ZigBee, infrared communication, or near field communication (NFC).

[0051] The terminal controller 210 controls data transmitted and received through the communication part 220 to be stored in the memory 230 and controls input and output of the data. The terminal controller 210 controls operation of the terminal according to data input through the communication part 220 or the input part 240 or controls operation setting of the unit to be changed through an application.

[0052] The terminal controller 210 displays a menu screen to input a user command on the display part 250, transmits data to the server or the unit through the communication part 220 according to input setting of the input part 240, and receives data from the server or the unit.

[0053] The terminal controller 210 executes the application stored in the memory 230 and accesses the server through the application to register the terminal. In addition, the terminal controller 210 may access each of the air conditioner sites through the application to receive and monitor information regarding each unit of each of the air conditioner sites. Alternatively, the terminal controller 210 may group the units to control operation of the

grouped units.

[0054] In this case, the terminal controller 210 transmits control commands to the respective communication modules of the communication part 220 to transmit and receive data to and from different communication object in different communication modes. For example, in a case in which the terminal controller 210 accesses the server or the unit through the application, the terminal controller 210 may perform access through the wireless communication module 221. In a case in which the terminal controller 210 accessing the server or the unit through the wireless communication module 221 is not possible, the terminal controller 210 may perform access through the mobile communication module 222. In a case in which an electric home appliance or the unit is within a short distance from the terminal, the terminal controller 210 may communicate with the electric home appliance or the unit through the short distance communication module 223.

[0055] Upon accessing the server 20 or the unit, the terminal controller 210 performs a predetermined authentication procedure according to a request from the server or the unit. The terminal controller 210 may transmit a unique identification number, such as identification (ID) and password, registered with the server to authenticate the terminal or may authenticate that the terminal has been registered through an additional authentication program.

[0056] Upon accessing the server or the unit, the terminal controller 210 may display screens different per ID on the display part 250 according to authority given by the server.

[0057] FIGS. 5 to 12 are views illustrating various embodiments of controlling a plurality of units constituting a plurality of air conditioners using the terminal in the air conditioner system according to the present invention.

[0058] FIG. 5 is a view illustrating construction of a control screen of the terminal to control air conditioner sites and units of the air conditioner sites.

[0059] As shown in FIG. 5(a), a menu screen to monitor and control a plurality of units constituting an air conditioner site is displayed on the display part 250 of the terminal 10.

[0060] Control items 202 for the air conditioner site or the units are displayed on a main menu screen as icons or text. An operation state 203 and operation information 204 of the accessed air conditioner site are also displayed on the main menu screen.

[0061] In addition, a site key 201 as a menu key to select a specific site from among a plurality of air conditioner sites is displayed at one side of the screen. A setting key for application or control setting is displayed. In addition, information, such as intensity of a signal, notification setting, battery capacity, and time, in connection with operation of the current terminal is displayed at one side of the screen.

[0062] The control items 202 displayed on the main menu screen include site state, Q control 205, schedule, and history management buttons. When the site state button is selected, it is possible to monitor an overall operation state of each unit of the air conditioner site. When the schedule button is selected, it is possible to set schedules for the units and to change predetermined schedules. When the history management button is selected, it is possible to confirm a control history and a history based on the change in operation of the air conditioner site.

[0063] When the Q control button 205 is selected on the main menu screen, a predetermined Q control list is output to the screen of the display part 250 as shown in FIG. 5(b). The Q control is provided to input and apply control setting within a short time. Specifically, the Q control is provided to set a predetermined control pattern or control profile including a unit to be controlled and a control command for the unit. The Q control list includes Q control items for which the Q control is set.

[0064] The Q control list includes Q control titles, the number of units or groups to be controlled, and an operation state, which are simply displayed. For example, whether operation is being performed or is stopped may be displayed as text or an icon. In addition, information regarding a control temperature, operation modes, and air volume, may be displayed.

[0065] In a case in which one item is selected from the Q control list in a state in which the Q control list is displayed, detailed information of the item selected from the Q control list is displayed. Alternatively, in a case in which an arrow located at the right end of each item is selected, the detailed information of the selected item is displayed.

[0066] FIG. 6 is a view illustrating a detailed screen of the terminal per Q control item.

[0067] When Q control is selected on the main menu screen as shown in FIG. 6(a), a predetermined Q control list is displayed. Items of the Q control list may be differently controlled. The items of the Q control list may be added or deleted. Alternatively, setting of the items of the Q control list may be changed. A key provided at the upper end of the Q control list may be selected to edit the Q control list.

[0068] In a case in which the Q control list, which includes a plurality of Q control items, is not fully displayed on one page, the screen may be dragged upward or downward to display the rest of the Q control list on the screen as shown in FIG. 6(b).

[0069] According to circumstances, in a case in which the screen is dragged to the left or to the right, the Q control list on the next page may be displayed. In addition, in a case in which the Q control list is not fully displayed on one page, an additional scroll bar may be displayed at one side of the screen.

[0070] When any one item is selected from the Q control list displayed on the screen of the display part 250, detailed information regarding the selected item is displayed as shown in FIG. 6(c).

[0071] In connection with the Q control, a control name 211 of the Q control, a set control command 212, and a

control device 213 to be controlled are displayed as detailed information. The control command and the control device as well as the control name may be changed through editing. When an apply key 214 is selected after changed, the changed setting is immediately applied.

[0072] In a case in which the Q control is changed, the terminal controller 210 creates a control signal based thereon and transmits the created control signal to the server or each air conditioner site or each unit to be changed through the communication part 220.

[0073] The control name 211 is set according to a user input through the input part 240. In a case in which there in no additional input, however, the control name 211 may be automatically set based on the type or position of the control device. Alternatively, the control name 211 may be automatically set according to default setting. For example, in a case in which all units of a resting room group are selected, the resting room may be input as the control name if there is no additional input. Alternatively, Q control N (N being an integer equal to or greater than 1) may be automatically input as the control name.

[0074] In the control command 212, whether operation is being performed or not, temperature, operation modes, air volume, and whether locking is being performed or not are displayed as letters, numbers, special characters, images, or emoticons.

[0075] The control device 213 is a device to be controlled. The control device 213 may be set based on a single unit, a group or groups set in the air conditioner site, the entirety of the air conditioner site, or a building in which some air conditioners are installed. In connection with the control device 213, the types and quantities of the units included in each group or each building group are displayed.

[0076] For example, the Q control setting having whole resting room operation as the control name includes a resting room of a welfare center, a resting room of a culture center, and a resting room of a nature center. Specifically, the Q control setting includes 340 indoor units and 340 ventilation units. In addition, the control devices of the Q control having operation of the whole resting rooms are set to 20 degrees cooling and a high level of air volume. Whole locking is applied to all units such that the setting cannot be changed by a remote controller.

[0077] The apply key 214 is selected and, at the same time, a control signal is transmitted to the included control devices to commence operation of the control devices.

[0078] When new Q control setting is finished or any one of the predetermined setting items is changed and then the apply key is input in the Q control setting as shown in FIG. 6(d), a guide message thereof is displayed on the lower end of the screen of the display part 250.

[0079] For example, when control setting is finished and then the apply key is input in the Q control having operation of the resting rooms of the culture center as the control name, control devices of the resting rooms of the culture center, e.g. 15 indoor units and 2 ventilation units installed in the resting rooms of third and fifth floors of the culture center, start to operate and a guide message indicating "15 indoor units and 2 ventilation units are operating."

[0080] When the apply key is input in FIG. 6(c) as previously described, a guide message indicating "340 indoor units and 340 ventilation units are operating" is displayed.

[0081] At this time, a guide voice or a predetermined effect sound may be output through the speaker 260 simultaneously when the guide message is displayed on the screen.

[0082] FIGS. 7 and 8 are reference views illustrating a Q control addition method performed by the terminal.

[0083] When a Q control key 221 is selected on the main control screen as shown in FIG. 7(a), a Q control list is displayed on the screen of the display part 250 as shown in FIG. 7(b).

[0084] In the Q control list, setting information per control item is simply displayed as at least one selected from among letters, numbers, images, emoticons, and special characters.

[0085] When an add key 222 positioned at the upper end of the screen is selected in a state in which a list including a plurality of control items is displayed, a new Q control may be set.

[0086] As shown in FIG. 7(c), a setting screen to add the new Q control is displayed on the display part 250.

[0087] A control name 225 for the Q control to be controlled may be input and an additional description thereof may be input to an input window 224. When an OK key 226 is selected, the control name is set. When a cancel key is selected, on the other hand, the input control name is canceled. As shown, Q control setting to release operation of a lecture room is performed.

[0088] When the OK key 226 is input, a pre-input control name 227 indicating 'operation of the lecture room has been released' is displayed on the screen and control setting 228 may be input as shown in FIG. 7(d). When the control setting part is selected, a list of control devices to be controlled is output to the screen of the display part 250 as shown in FIG. 7(e).

[0089] At this time, information regarding the site in which the units are positioned or information regarding a specific region in the site is displayed at the upper end of the screen. For example, the units displayed in the control device list are units belonging to the culture center. The culture center includes 50 indoor units and 30 ventilation units. In addition, the number of the units of the culture center that are operating, the units of the culture center that are stopped, and the units of the culture center that are out of service are also displayed.

[0090] A list of a plurality of units is output. At this time, in the list, groups for the units are displayed in predetermined order and individual units that are not grouped are displayed as ungrouped units.

[0091] In addition, the types and numbers of the units belonging to the groups are displayed together with the group names in the control device list.

[0092] For example, a first floor group includes 20 indoor units and 5 ventilation units. In addition, it can be seen that 10 indoor units and 5 ventilation units are present as the ungrouped units.

[0093] In the control device list, a check box is displayed at the left side of each group name or each unit name. When the check box is selected, a mark 'v' is displayed and, in addition, a guide message 229 indicating that the corresponding group or unit has been selected is displayed.

[0094] In addition, information regarding the selected group or unit is also displayed at the lower end of the screen. For example, when a lecture room is selected, a check box of the lecture room is selected and a guide message 229 indicating that 20 indoor units and 5 ventilation units have been selected is displayed at the lower end of the screen.

[0095] When the selection of the control devices is finished and a next key is selected on the screen, it is possible to set a control command for the selected control devices as shown in FIG. 8(a).

[0096] Operation setting 232 to select operation ON/OFF, air volume setting 233, and whole locking of the selected control devices are displayed on a control command setting screen.

[0097] For example, operation OFF is selected in the operation setting 232 since the Q control is set to release operation of the lecture room. Any one may be selected from among automatic, high, and low in the air volume setting. When the whole locking is selected, all of the selected control devices are locked such that the setting of each unit cannot be changed by a remote controller.

[0098] At this time, when a next key 231 provided at the upper end of the screen is selected, pre-input Q control setting is displayed on the screen as shown in FIG. 8(b). Since the Q control is a control to release operation of the lecture room, only information regarding operation OFF and information 238 regarding the selected control devices are displayed in a control command 237. The control command 237 and the control devices may be changed through an edit key. A control name 236 may also be selected and changed.

[0099] When a finish key 235 provided at the upper end of the screen is selected, a newly added Q control item 239 is added to the Q control list and output to the screen of the display part 250 as shown in FIG. 8(c). The newly added item may be displayed using a color different than those of the other items. The newly added item is positioned at the lower end of the list.

[0100] FIG. 9 is a view illustrating a control setting screen based on the types of control devices included in an air conditioner site.

[0101] FIG. 9(a) shows that, in a case in which different types of units are set as the control devices, a control command setting screen is displayed on the display part 250.

[0102] In a case in which different types of units are set as the control devices, for example in a case in which an indoor unit and a ventilation unit are set as the control devices, control commands common to the indoor unit and the ventilation unit may be set.

[0103] In connection with the units included in the air conditioner site, control commands commonly applicable to the units are operation ON/OFF setting, air volume, and locking setting.

[0104] In a case in which only the indoor unit is set as the control device, control commands for the indoor unit may be set as shown in FIG. 9(b). In a case in which only the indoor unit is set as the control device, control commands in connection with operation of the indoor unit may be set.

[0105] As the control commands for the indoor unit, operation setting, operation modes, a setting temperature, air volume, a limit temperature, automatic setting of air volume, and locking setting are possible.

[0106] In the operation setting, operation ON/OFF may be selected. In the operation mode, the indoor unit may be set to operate in any one mode selected from among cooling, dehumidification, heating, automatic, and ventilation.

[0107] In addition, setting temperature of the indoor unit may be selected. In connection therewith, air volume may be set to any one selected from among high, intermediate, low, and automatic. At this time, automatic setting of the air volume may be set or released and limit temperature may be set for a plurality of indoor units included in the control devices. The limit temperature may be set for both the minimum temperature and the maximum temperature. For example, in a case in which the minimum temperature is set to 18 degrees and the maximum temperature is set to 27 degrees, the setting temperature cannot be set to lower than 18 degrees in the cooling mode and the setting temperature cannot be set to higher than 27 degrees in the heating mode.

[0108] In addition, the locking setting may be individually performed for a mode, temperature, and air volume in addition to whole locking of all control devices (indoor units). That is, for whole locking, mode setting cannot be changed. In a case in which only mode is set to be locked, however, the mode cannot be changed but the temperature and the air volume can be individually controlled in the indoor units. In a case in which the temperature or the air volume is individually set to be locked, on the other hand, only the temperature or the air volume is locked and thus setting thereof cannot be changed. Other settings may be changed.

[0109] FIG. 9(c) is a view showing a control command setting screen of a ventilation unit. As shown in FIG. 9(c), control commands for the ventilation unit may be set for operation setting, operation modes, air volume, extra functions, and locking setting.

[0110] Selectable operation modes of the ventilation unit include an automatic mode, a heat transfer mode, and a normal mode. In addition, the air volume may be set to high, intermediate, low, and automatic. In the locking setting, whole locking and locking release are possi-

ble.

[0111] The extra functions of the settable control commands of the ventilation unit include a rapid function, a humidification function, a power saving function, and a heater function. Each function may be controlled ON/OFF.

[0112] For a direct expansion type ventilation unit as shown in FIG. 9(d), operation setting, operation modes, setting temperature, air volume, an air conditioner function, extra functions, and locking setting functions are provided in control commands.

[0113] The operation mode may be set to any one selected from among the automatic mode, the heat transfer mode, and the normal mode and the setting temperature may be input as in the indoor unit. In addition, the air volume may be set to any one selected from among high, intermediate, low, and automatic.

[0114] The direct expansion type ventilation unit has an air conditioner function unlike a general ventilation unit. Consequently, the direct expansion type ventilation unit may be set to any one selected from along air conditioner ON/OFF, cooling, automatic, and heating. That is, the direct expansion type ventilation unit has a combination of a ventilation function and a cooling and heating air conditioner. Consequently, the direct expansion type ventilation unit simultaneously provides the ventilation function and the cooling and heating function.

[0115] In addition, the extra functions may be set as in the ventilation unit. ON/OFF control setting is possible for a rapid mode, power saving, humidification, and a heater.

[0116] Whole locking may be set and released.

[0117] When the Q control is added as previously described with reference to FIGS. 7 and 8, the control command setting screen may be differently displayed based on the types of the units set as the control devices as described above and, therefore, functions settable according thereto may be changed.

[0118] In a case in which different types of units are simultaneously set as the control devices, however, control setting may be performed for the common functions as shown in FIG. 9(a). In a case in which only the indoor unit is set as the control device, the control command setting screen is displayed as shown in FIG. 9(b). In a case in which only the ventilation unit is set as the control device, on the other hand, the control command setting screen is displayed on the screen of the display part 250 as shown in FIG. 9(c).

[0119] FIG. 10 is a view illustrating a Q control list displayed on the display part of the terminal.

[0120] As shown in FIG. 10(a), the Q control list is displayed on the screen of the display part 250. A plurality of Q control items of the Q control list is arranged and displayed in predetermined order. Setting information per Q control item is simply displayed.

[0121] When the number of the items of the Q control list is equal to or greater than a predetermined value, the Q control list is displayed on one or more screens. In this case, the screen may be dragged or scrolled to display the last item of the Q control list.

[0122] When an edit key 241 is selected in a state in which the Q control list is displayed, an edit mode to change the Q control list is displayed.

[0123] In a case in which any one of the control items of the Q control list displayed on the screen is selected and dragged in the edit mode as shown in FIG. 10(b), the selected control item may be moved in the dragged direction.

[0124] For example, in a case in which a whole culture center building OFF item 245 is selected from the control items and is dragged downward, the whole culture center building OFF item 245 moves to the lower side of the list.

[0125] The display position of the control item is changed to a position on which the dragging operation is stopped.

[0126] As shown in FIG. 10(c), therefore, the whole culture center building OFF item 245, which was displayed under a culture center lecture room cooling item, moves to under a culture center restroom OFF item through editing of the list and is displayed.

[0127] In this way, the position of the items of the Q control list may be changed and displayed. That is, the position of frequently used Q control items may be changed to be positioned at the upper end of the control list.

[0128] FIG. 11 is a reference view illustrating an edit function of the Q control list.

[0129] As previously described, the predetermined Q control may be changed through an edit menu. When edit keys 252 and 253 provided for corresponding items, such as a control command and a control device, are selected on a detailed Q control screen as shown in FIG. 11(a), setting of the respective items may be changed.

[0130] For a control name, an input control name 251 is selected to switch to an edit mode to change the control name without an additional edit key.

[0131] At this time, when the control name 251 is selected, an edit mode to change the control name is displayed on the screen as shown in FIG. 11(b). At this time, a keyboard 256-1 appears on one side of the edit mode screen.

[0132] In the control name edit mode, a currently set control name 256 is displayed and an input window 256-4 is displayed under the control name 256 to input a new control name. A soft key of the keyboard 256-1 appearing on the screen may be selected to change the control name.

[0133] When the change of the control name is finished, an OK key 256-2 is input. A cancel key 256-3 or a previous key is selected to maintain the existing setting without change.

[0134] When the edit key 252 provided at the right of the control command item is selected on the detailed Q control screen shown in FIG. 11(a) to change the control command, a control command setting screen to change a predetermined control command is displayed as shown

in FIG. 11(c).

[0135] Predetermined information may be displayed on the control command setting screen and each item may be selected such that each item has a setting value to be changed.

[0136] Whether operation is being performed or not, temperature, a mode, air volume, an air direction, and locking may be set on the control command setting screen. The screen may be scrolled upward and downward or dragged to move the screen.

[0137] At this time, the control command setting screen may be differently displayed based on control devices. The control command setting screen per control device has been described previously with reference to FIG. 9.

[0138] When the change of the control command is finished, an OK key or a finish key 257-1 is input. A cancel key or a previous key 257-2 is selected to maintain the existing setting without change.

[0139] In addition, in a case in which the control device is to be changed, a control device setting screen is displayed as shown in FIG. 11(d).

[0140] Information regarding a control device per position is displayed on the control device setting screen and a check box is selected to set a control device, i.e. an object to be controlled. For any one of the preselected control devices, if necessary to be excluded from the objects to be controlled, a check box of the control device may be reselected to release selection of the control device.

[0141] When the change of the control device is finished, an OK key or a finish key 258-1 is input. A cancel key or a previous key 258-2 is selected to maintain the existing setting without change.

[0142] When the change of the Q control is finished as described above, changed Q control item 259 based on the changed setting is reflected in the list and displayed as shown in FIG. 11(e).

[0143] When setting of each control command and each control device is finished, the detailed information is changed into the change information, which is displayed, as shown in FIG. 11(a). When an apply key is selected, the change is finally finished and reflected.

[0144] In a case in which control according to the changed Q control is being already performed, i.e. in a case in which the Q control is changed as described above in a state in which units of whole resting rooms are already being performed according to the Q control to operate the whole resting rooms, a control command based on the changed Q control setting is transmitted to a plurality of units included in the control devices or controllers to control the corresponding units. As a result, operation of the control devices is controlled according to the changed Q control setting.

[0145] FIG. 12 is a view showing a method of adding Q control during monitoring of a state of the air conditioner. As shown in FIG. 12(a), the terminal monitors an operation state of the air conditioner per site. The operation state of the air conditioner is displayed per group or installation position through a site state menu. When an arrow displayed at the right side of each item is selected, detailed information regarding the corresponding group is displayed.

[0146] A check box is provided at the left side of each item of an air conditioner unit list. When the check box is selected, the selected unit is automatically set as a control device and, therefore, addition of Q control is possible.

[0147] When a check box 261 of a first floor is selected, a message 262 corresponding to selection of the first floor is displayed at the lower end of a site state screen as shown in FIG. 12(b). For example, 20 indoor units and 5 ventilation units may be installed at the first floor. When the first floor item is selected, a message indicating that 20 indoor units and 5 ventilation units have been selected as control devices is displayed. At this time, a selection release key 262-1 is displayed at the right side of the message. When the selection release key is selected, the selection of the check box is released.

[0148] In addition, when any one item is selected as described above, a control key 262-2 provided at the upper end of the screen is activated. When the control key is selected, a control command setting screen 263 according to addition of Q control for the control device selected through the check box is displayed as shown in FIG. 12(c).

[0149] The number of the selected units is displayed at the upper end of the screen and operating setting for the selected units, i.e. the selected control devices, is possible. Operation ON selection key and OFF selection key 264 are provided and automatic, high, and low are displayed as air volume. In addition, whole locking may be selected. At this time, the control command setting screen may be differently displayed depending upon the types of the selected control devices, i.e. the selected units.

[0150] At this time, a selection box 265 for the addition of Q control is displayed at the lower end of the screen.

[0151] When the selection box 265 is selected, a guide message 266 for the addition of Q control is displayed at the lower end of the screen as shown in FIG. 12(d). When the selection box 265 is selected and then an apply key 267 is selected, setting of Q control is newly added. When a previous key is pushed or cancel is selected without selection of the apply key, on the other hand, the addition of Q control is canceled.

[0152] When the new Q control is added, setting of the new Q control is immediately applied to the corresponding unit of the air conditioner as shown in FIG. 12(e).

[0153] For example, in a case in which Q control for operation stop is added, operations of all of the units of the corresponding first floor are stopped. At the same time, a guide message 268 is displayed.

[0154] And when the new Q control is added, a new Q control item 269 is added to the lower end of the Q control list as shown in FIG. 12(f).

[0155] When the new Q control is applied and the op-

erations of the units are changed as shown in FIG. 12(f), state information thereof is displayed to display that operations of all of the first floor units have been stopped.

[0156] In this way, the present invention monitors states of the air conditioner units and controls operations of the air conditioner units through simple control setting.

[0157] Although all components constituting the embodiment of the present invention have been described as being combined into one component or being combined into one component and being operated as one component, the present invention is not limited thereto. According to embodiments, all components constituting each of the embodiments may be selectively coupled into one or more components and be operated as one or more components.

[0158] Although each of the components may be realized as independent hardware, some or all of the components may be selectively combined as a computer program having a program module executing some or all functions combined from one or several pieces of hardware.

[0159] As is apparent from the above description, in the air conditioner with the above-stated construction and the method of controlling the same, it is possible to easily and conveniently monitor and control the air conditioner at a remote place and to group and ungroup air conditioners irrespective of a real installation state and a connection state of each unit, thereby achieving rapid and convenient control of the air conditioner. In addition, it is possible to selectively group a plurality of air conditioners installed over a wide area without being restricted in one house or one building such that the air conditioners can be simultaneously controlled, thereby greatly improving convenience of control and user convenience.

Claims

1. An air conditioner comprising:

a plurality of units installed at a plurality of areas in a decentralized fashion;
a plurality of air conditioner sites (31, 32, 33) comprising the units per area; and
a terminal (10) for accessing the units and the air conditioner sites (31, 32, 33) to monitor operation states of the units and the air conditioner sites (31, 32, 33) and control operations of the units and the air conditioner sites (31, 32, 33), wherein
the terminal (10) sets at least one of the units as a device to be controlled (213), irrespective of installation positions and connection states of the units, sets and stores at least one control setting comprising a control command (212) for the device to be controlled, and applies the control setting or releases application of the control setting using one button such that the units set as the device to be controlled are simultaneously operated according to the control command (212).

2. The air conditioner according to claim 1, wherein the terminal (10) is connected to the units and the air conditioner sites (31, 32, 33) over a network (N) to monitor and control the operations of the units and the air conditioner sites (31, 32, 33), and
the terminal (10) comprises a processing unit having a computer program stored thereon, wherein the computer program provides states of the units and the air conditioner sites (31, 32, 33), a control menu to set and control groups, and a schedule and setting menu.

3. The air conditioner according to claim 1 or 2, wherein the terminal (10) displays at least one pre-stored control setting as a list and displays information regarding operation state information for a plurality of control setting items on the list, and
when any one of the control setting list is selected, the terminal displays detailed information regarding the selected control setting.

4. The air conditioner according to claim 1, 2, or 3, wherein, when new control setting is created, the terminal (10) selects a control name, a device to be controlled, and a control command, outputs detailed information regarding the new control setting, and adds the new control setting to the control setting list when the setting is finished.

5. The air conditioner according to claim 4, wherein, when the new control setting is finished, the terminal (10) transmits the control command to the device to be controlled corresponding to the control setting such that the new control setting is immediately applied.

6. The air conditioner according to any one of claims 1 to 5, wherein, when at least one of the units or at least one of the air conditioner sites is selected on a monitoring screen for the units and the air conditioner sites (31, 32, 33), the terminal (10) creates a new control setting having the selected unit as a device to be controlled.

7. The air conditioner according to any one of claims 1 to 6, wherein the terminal performs the control setting for any one selected from among a building unit at which the units are located, a floor unit in one building, and type of a room for the air conditioner sites (31, 32, 33).

8. The air conditioner according to any one of claims 1 to 7, wherein the terminal performs control such that the device to be controlled comprises a unit of a first

air conditioner site and a unit of a second air conditioner site in one control setting for the air conditioner sites (31, 32, 33).

9. The air conditioner according to any one of claims 1 to 8, wherein the terminal sets different control commands based on types of the units set as the device to be controlled for the control setting and sets the control commands as functions commonly applicable to the types of the units.

10. A method of controlling an air conditioner performed by a terminal (10) comprising:

accessing a plurality of units and a plurality of air conditioner sites (31, 32, 33) comprising the units to receive operation information by executing a computer program provided in the terminal;
displaying at least one control setting to control the units and the air conditioner sites (31, 32, 33) together with the operation information as a list;
immediately applying a control command to at least one unit set as a device to be controlled or releasing application of the control command for any one control setting selected from the control setting list; and
transmitting the control command to the device to be controlled corresponding to the control setting to control operation of the device to be controlled.

11. The method according to claim 10, further comprising, when new control setting is created, selecting a control name, a device to be controlled, and a control command for the new control setting, outputting detailed information regarding the new control setting, and adding the new control setting to the control setting list when the setting is finished.

12. The method according to claim 10 or 11, further comprising, when the new control setting is finished, transmitting the control command to the device to be controlled corresponding to the control setting such that the new control setting is immediately applied.

13. The method according to claim 10, 11, or 12, further comprising:

displaying the received operation information on a monitoring screen; and
when at least one of the units or at least one of the air conditioner sites (31, 32, 33) is selected on the monitoring screen, creating new control setting having the selected unit or the selected air conditioner site as a device to be controlled.

14. The method according to any one of claims 11 to 13, further comprising:

setting different control commands based on types of the units set as the device to be controlled when the new control setting is created; and
setting the control commands as functions commonly applicable to the types of the units.

15. The method according to any one of claims 11 to 14, further comprising setting a unit located in any one selected from among a building unit at which the units are located, a floor unit in one building, and type of a room as the device to be controlled for the air conditioner sites when the new control setting is created.

Fig. 1

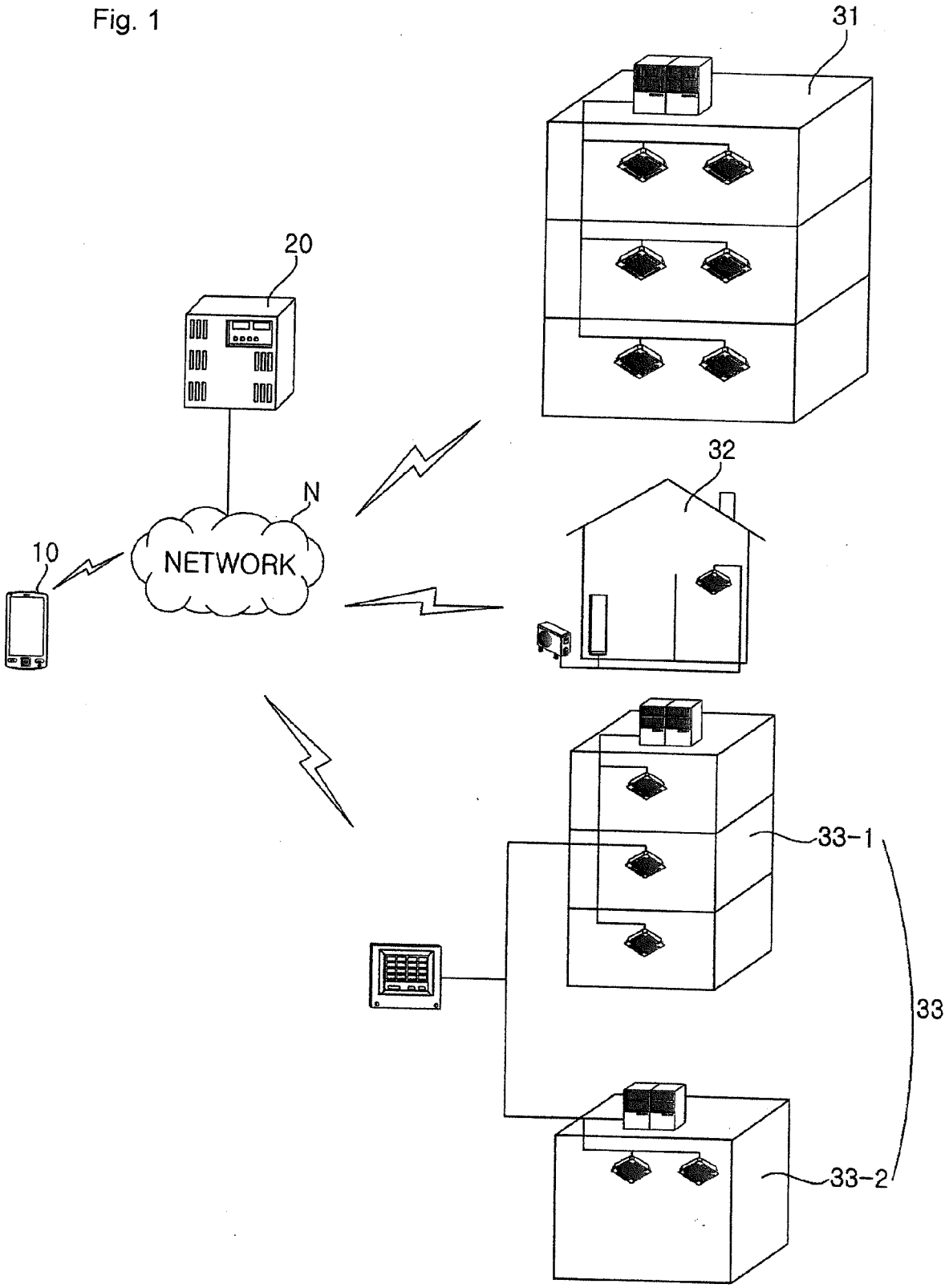


Fig. 2

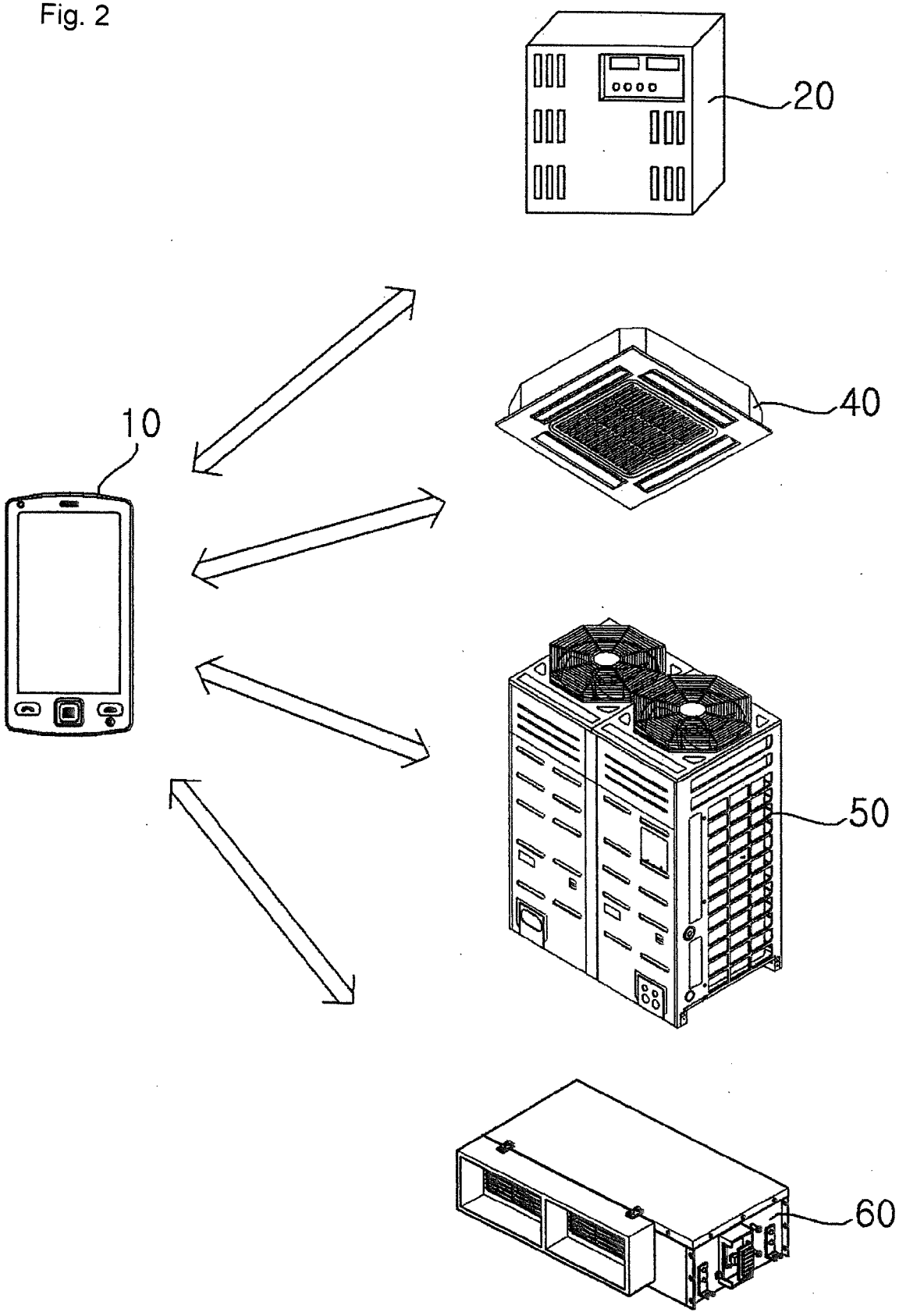


Fig. 3

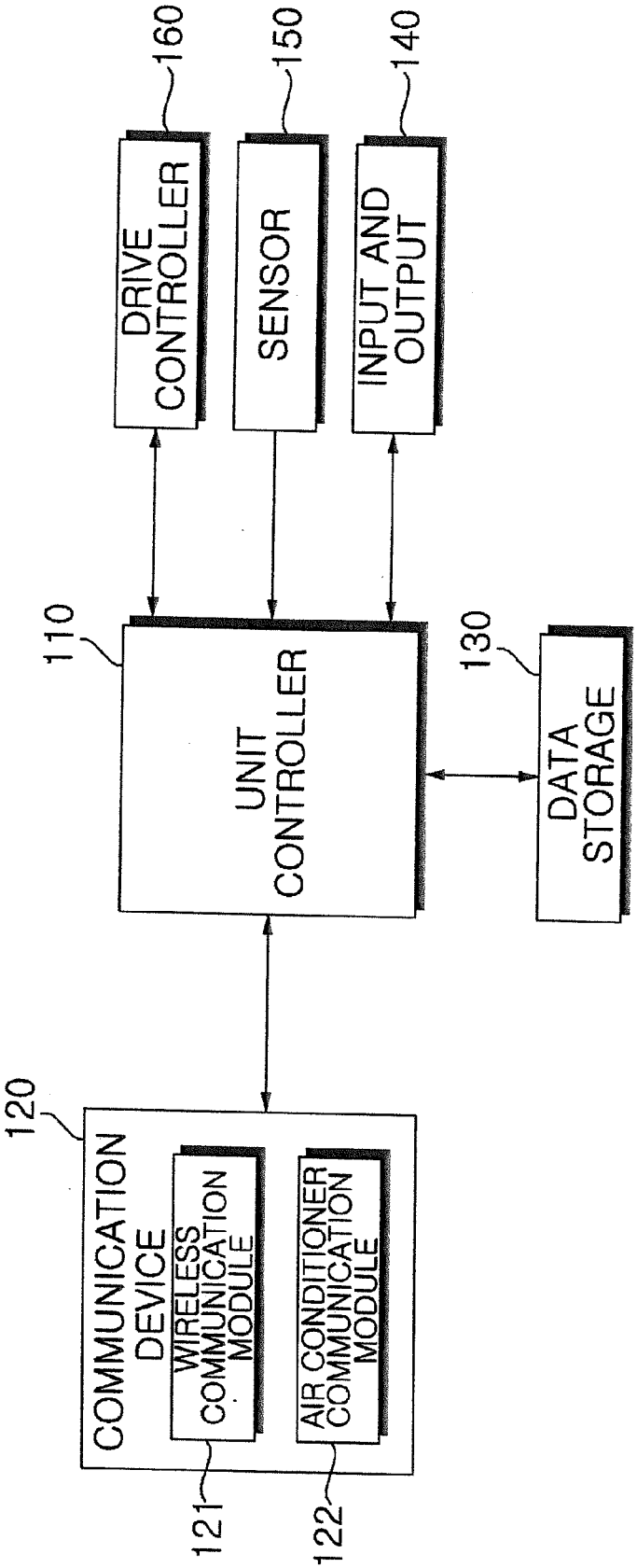

160
150
140
DRIVE CONTROLLER
SENSOR
INPUT AND OUTPUT
110
UNIT CONTROLLER
130
DATA STORAGE
120
COMMUNICATION DEVICE
WIRELESS COMMUNICATION MODULE
AIR CONDITIONER COMMUNICATION MODULE
121
122

Fig.4

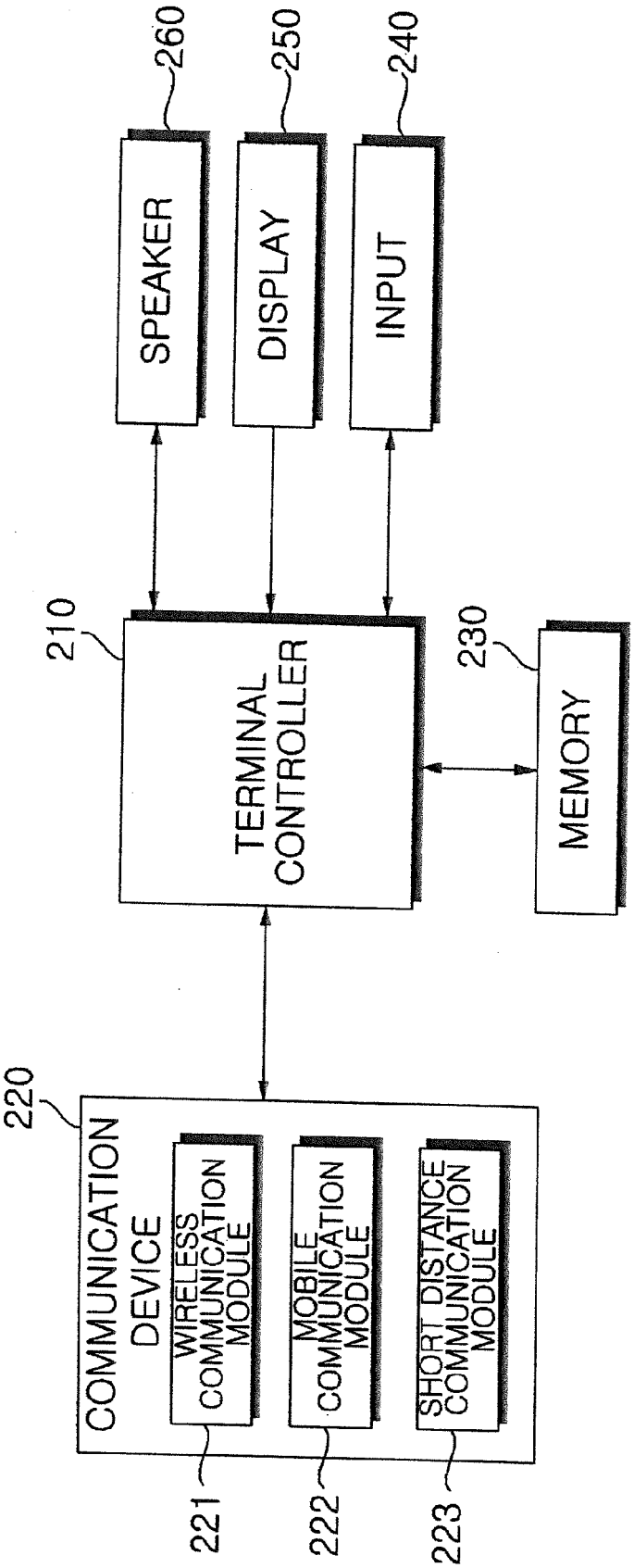

260
250
240
SPEAKER
DISPLAY
INPUT
210
TERMINAL CONTROLLER
230
MEMORY
220
COMMUNICATION DEVICE
WIRELESS COMMUNICATION MODULE
MOBILE COMMUNICATION MODULE
SHORT DISTANCE COMMUNICATION MODULE
221
222
223

Fig. 5a

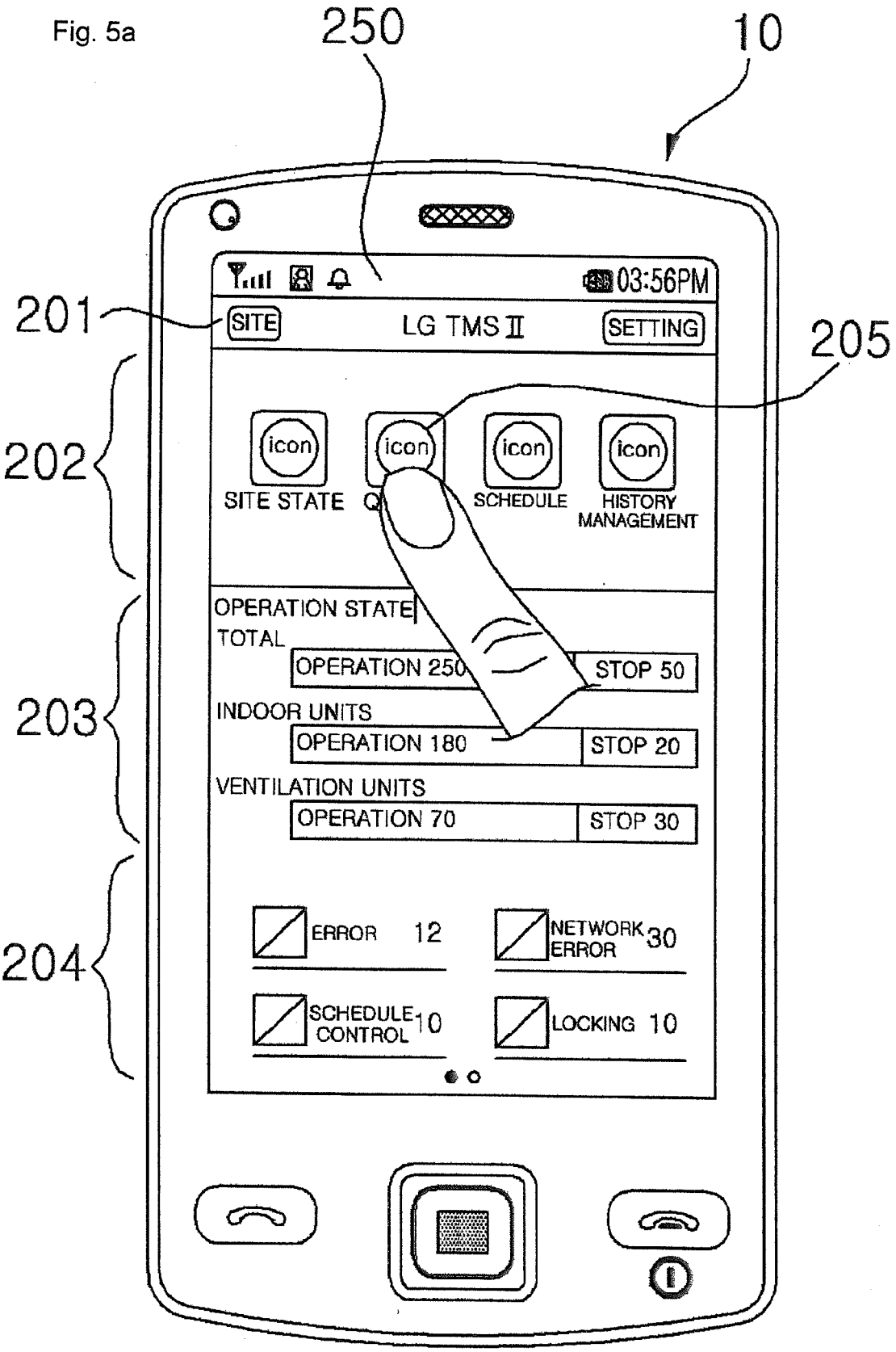

250
10
201
205
202
203
204
03:56PM
SITE
LG TMS II
SETTING
icon
icon
icon
icon
SITE STATE
SCHEDULE
HISTORY MANAGEMENT
OPERATION STATE
TOTAL
OPERATION 250
STOP 50
INDOOR UNITS
OPERATION 180
STOP 20
VENTILATION UNITS
OPERATION 70
STOP 30
ERROR 12
NETWORK ERROR 30
SCHEDULE CONTROL 10
LOCKING 10

Fig. 5b

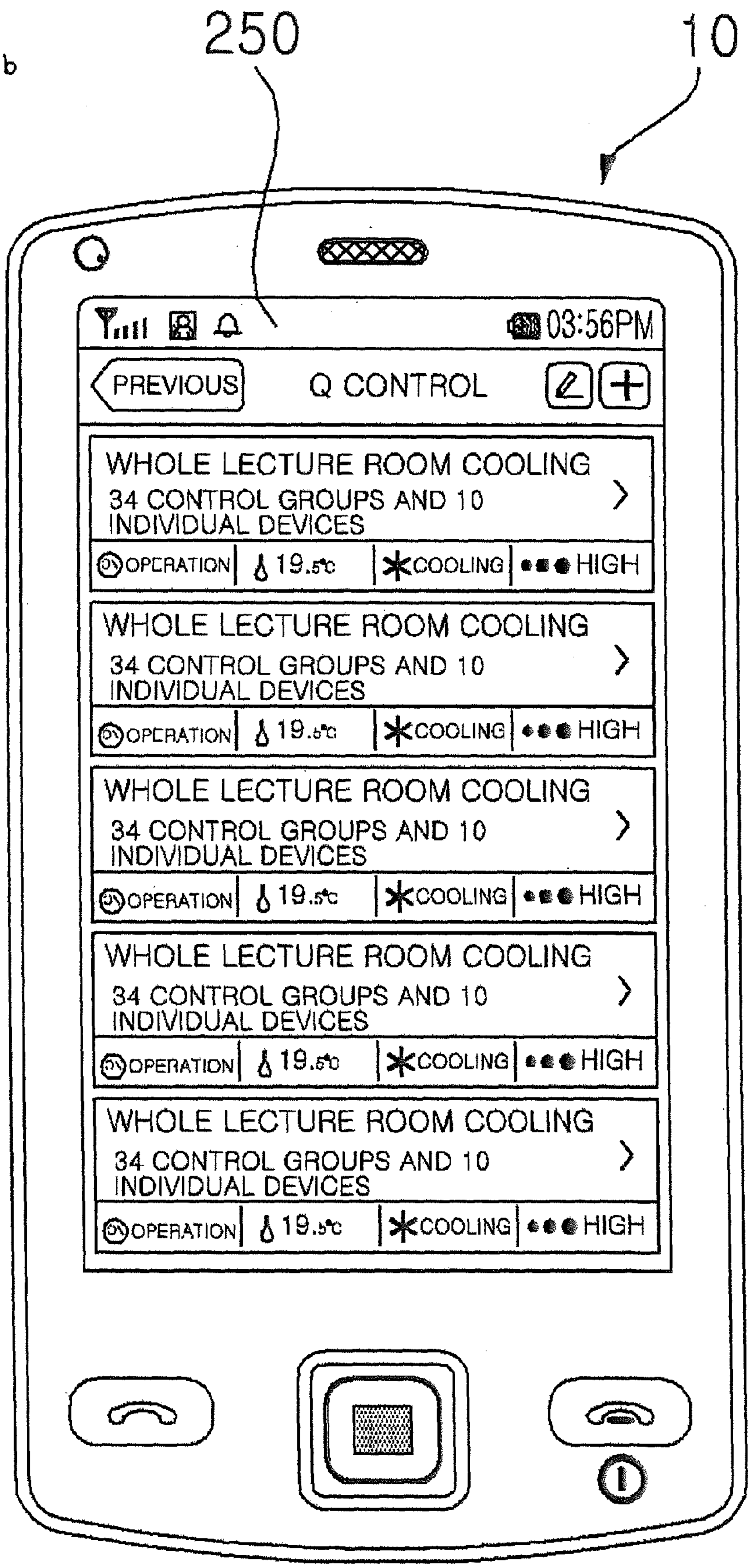

250
10
03:56PM
PREVIOUS
Q CONTROL
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH

Fig. 6a

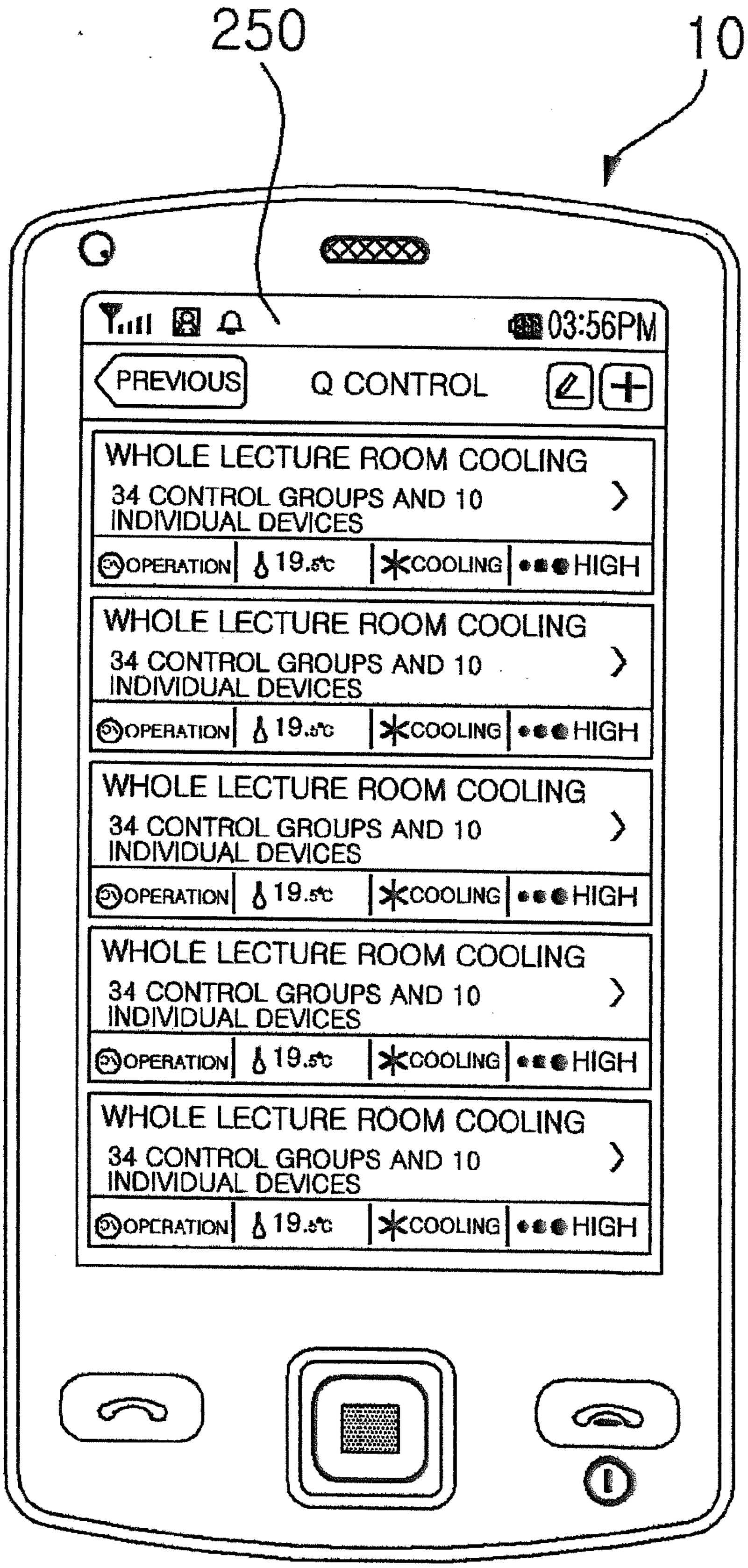

250
10
03:56PM
PREVIOUS
Q CONTROL
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH

Fig. 6b

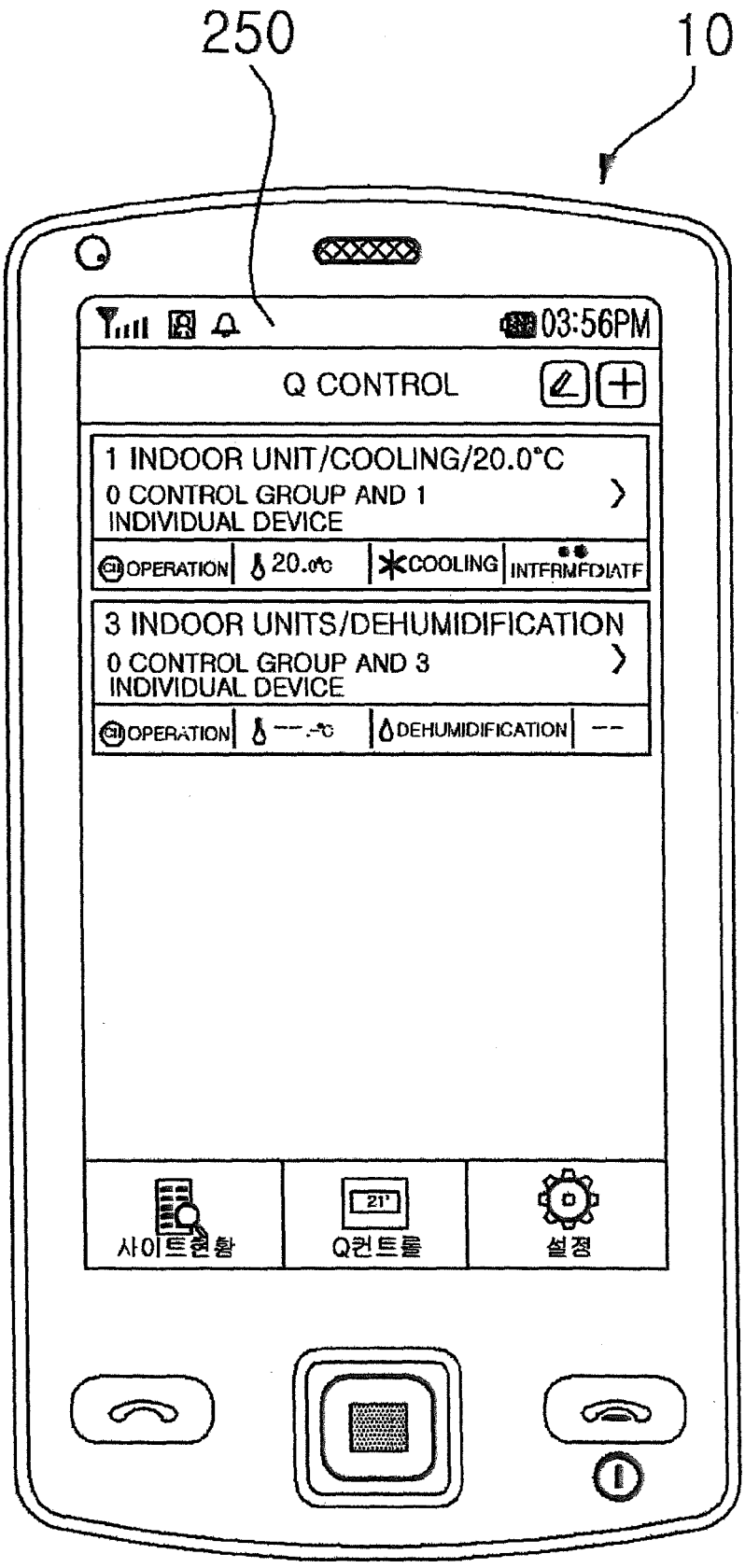

250
10
03:56PM
Q CONTROL
1 INDOOR UNIT/COOLING/20.0°C
0 CONTROL GROUP AND 1
INDIVIDUAL DEVICE
OPERATION
20.0°C
COOLING
INTERMEDIATE
3 INDOOR UNITS/DEHUMIDIFICATION
0 CONTROL GROUP AND 3
INDIVIDUAL DEVICE
OPERATION
DEHUMIDIFICATION
사이트현황
Q컨트롤
설정

Fig. 6c

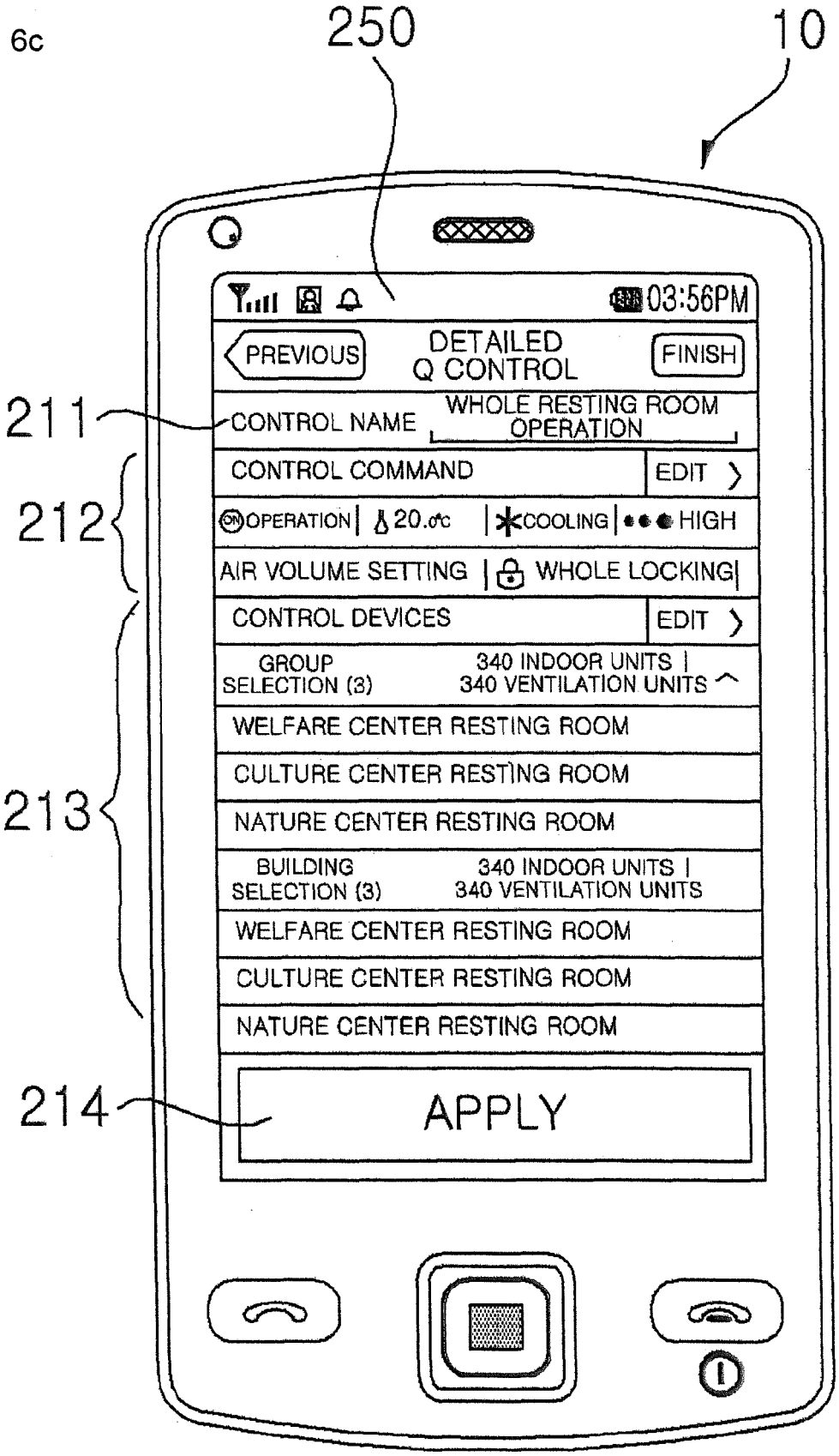

250
10
03:56PM
PREVIOUS
DETAILED Q CONTROL
FINISH
211
CONTROL NAME
WHOLE RESTING ROOM OPERATION
CONTROL COMMAND
EDIT
212
ON OPERATION
20.0°C
COOLING
HIGH
AIR VOLUME SETTING
WHOLE LOCKING
CONTROL DEVICES
EDIT
213
GROUP SELECTION (3)
340 INDOOR UNITS | 340 VENTILATION UNITS
WELFARE CENTER RESTING ROOM
CULTURE CENTER RESTING ROOM
NATURE CENTER RESTING ROOM
BUILDING SELECTION (3)
340 INDOOR UNITS | 340 VENTILATION UNITS
WELFARE CENTER RESTING ROOM
CULTURE CENTER RESTING ROOM
NATURE CENTER RESTING ROOM
214
APPLY

Fig. 6d

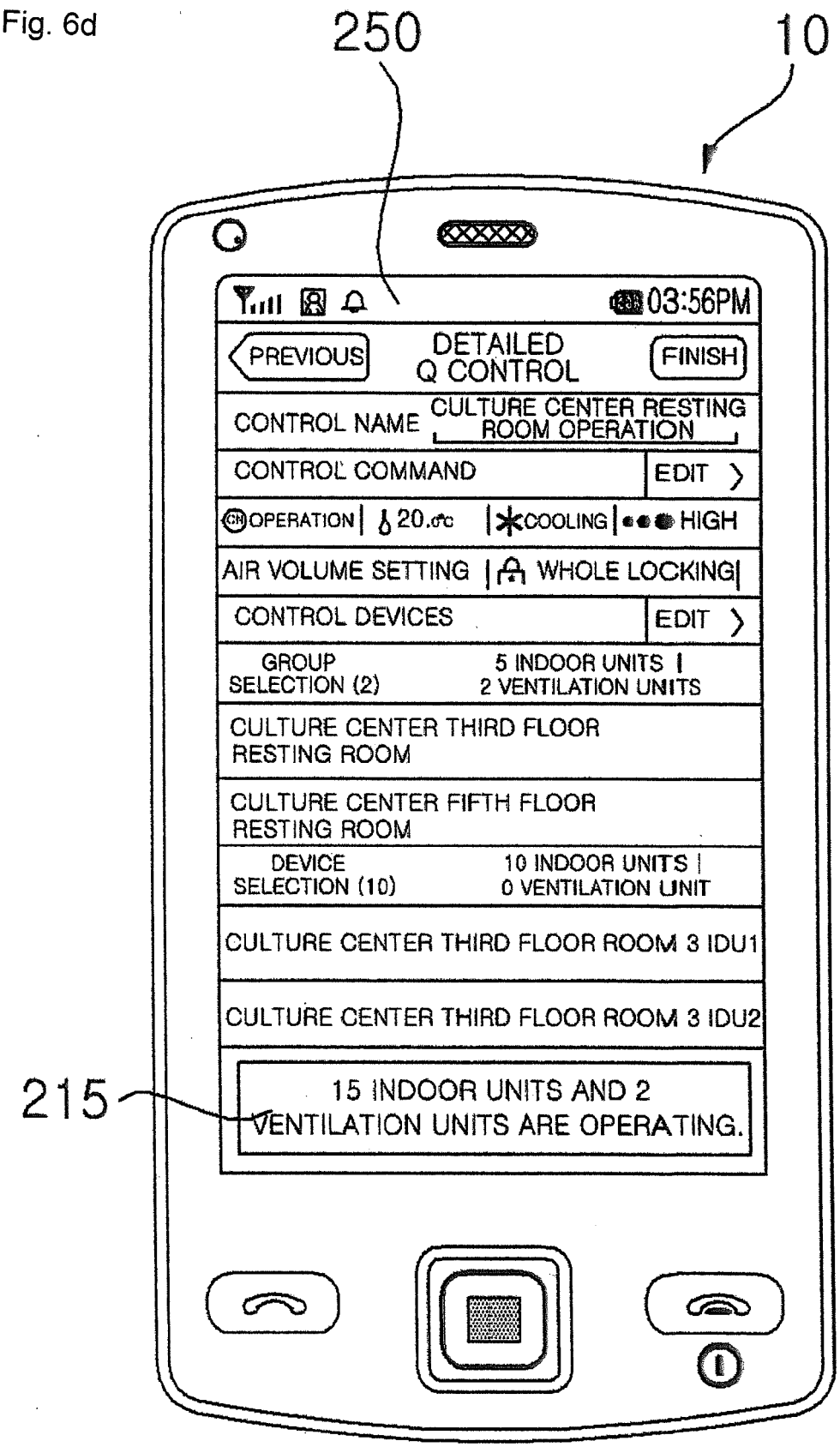

250
10
03:56PM
PREVIOUS
DETAILED Q CONTROL
FINISH
CONTROL NAME
CULTURE CENTER RESTING ROOM OPERATION
CONTROL COMMAND
EDIT
OPERATION
20
COOLING
HIGH
AIR VOLUME SETTING
WHOLE LOCKING
CONTROL DEVICES
EDIT
GROUP SELECTION (2)
5 INDOOR UNITS
2 VENTILATION UNITS
CULTURE CENTER THIRD FLOOR RESTING ROOM
CULTURE CENTER FIFTH FLOOR RESTING ROOM
DEVICE SELECTION (10)
10 INDOOR UNITS
0 VENTILATION UNIT
CULTURE CENTER THIRD FLOOR ROOM 3 IDU1
CULTURE CENTER THIRD FLOOR ROOM 3 IDU2
15 INDOOR UNITS AND 2 VENTILATION UNITS ARE OPERATING.
215

Fig. 7a

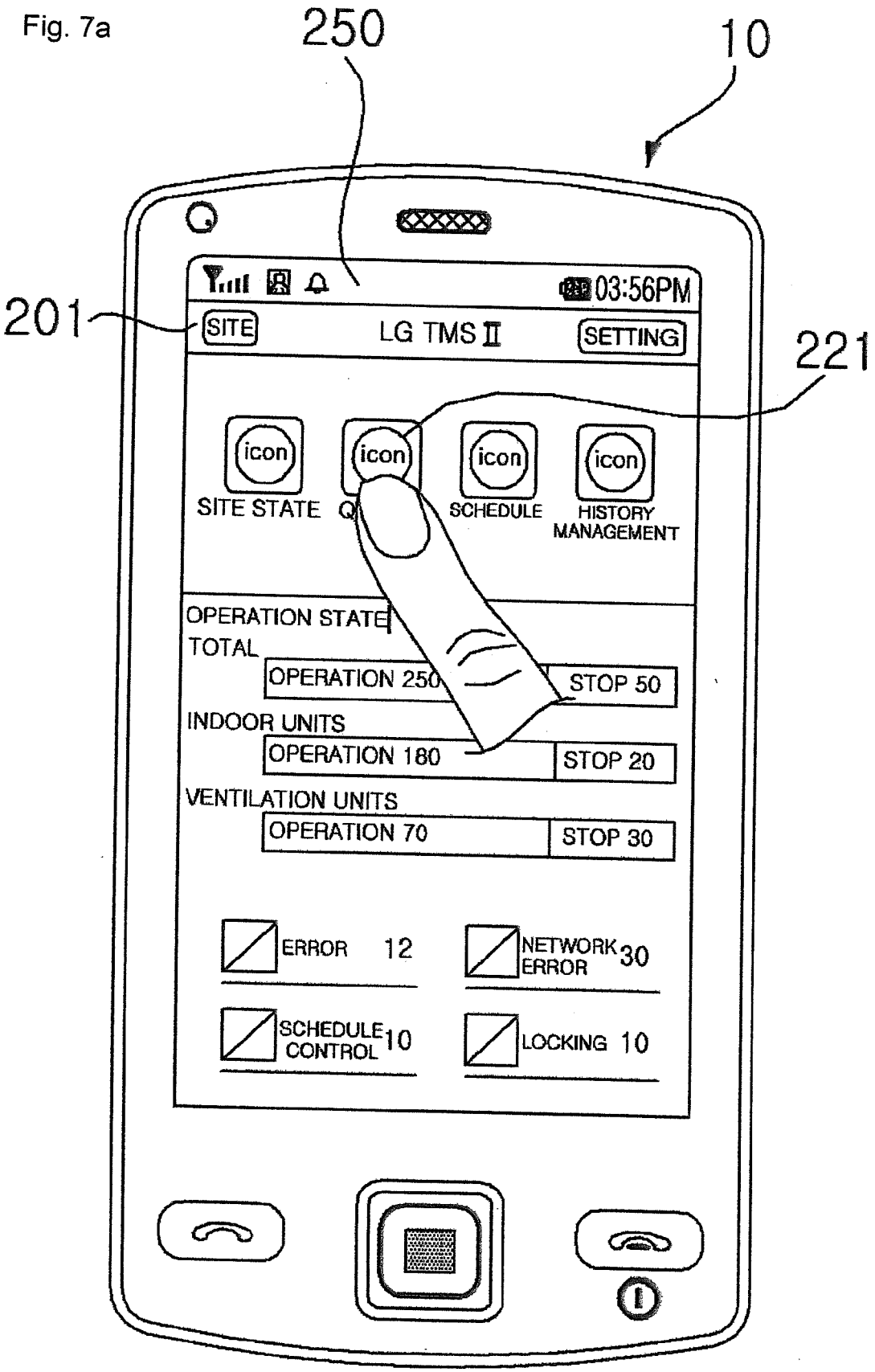

250
10
201
221
03:56PM
SITE
LG TMS II
SETTING
icon
icon
icon
icon
SITE STATE
SCHEDULE
HISTORY MANAGEMENT
OPERATION STATE
TOTAL
OPERATION 250
STOP 50
INDOOR UNITS
OPERATION 180
STOP 20
VENTILATION UNITS
OPERATION 70
STOP 30
ERROR 12
NETWORK ERROR 30
SCHEDULE CONTROL 10
LOCKING 10

Fig. 7b

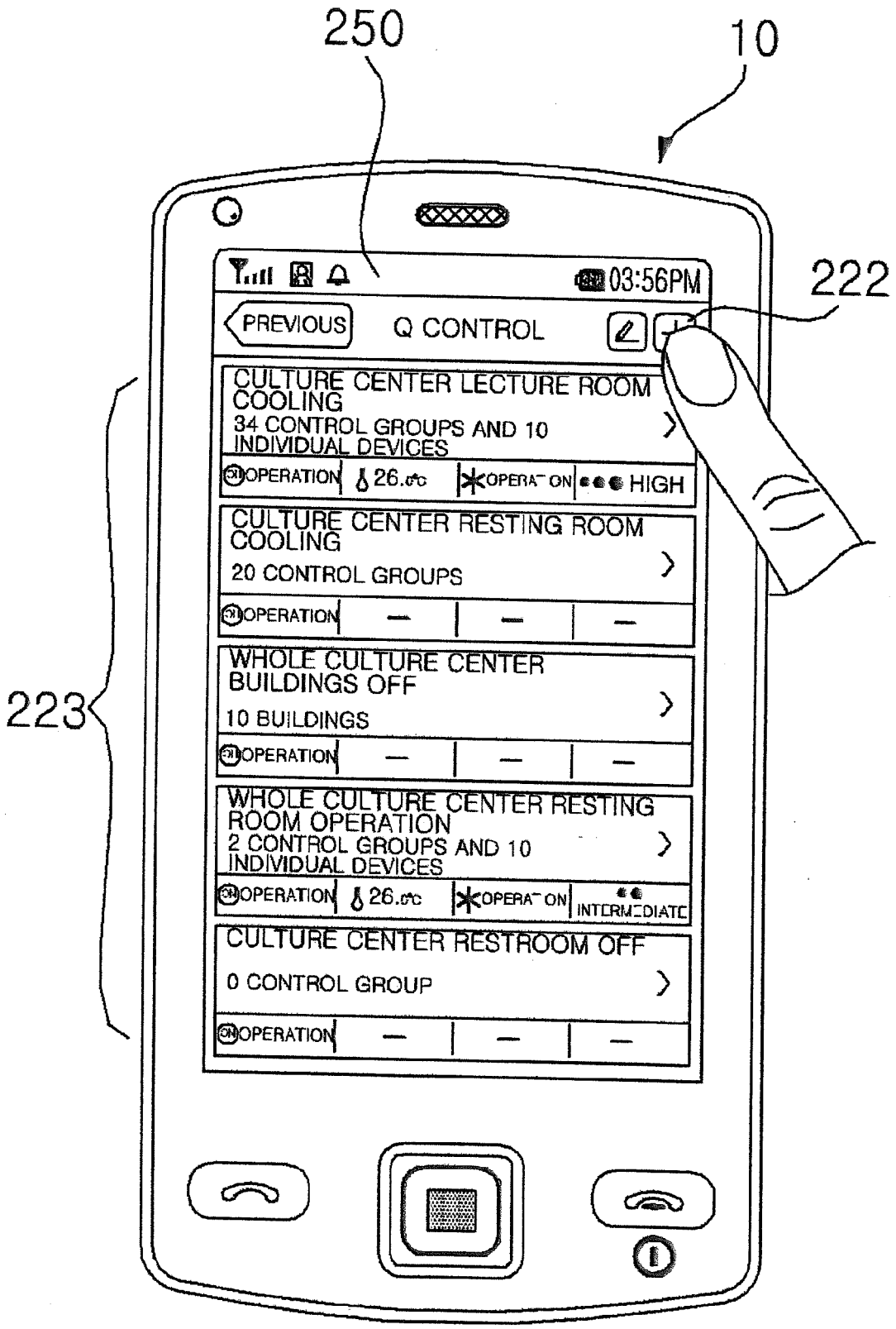

250
10
222
223
03:56PM
PREVIOUS
Q CONTROL
CULTURE CENTER LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
26.0℃
OPERATION
HIGH
CULTURE CENTER RESTING ROOM COOLING
20 CONTROL GROUPS
OPERATION
WHOLE CULTURE CENTER BUILDINGS OFF
10 BUILDINGS
OPERATION
WHOLE CULTURE CENTER RESTING ROOM OPERATION
2 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
26.0℃
OPERATION
INTERMEDIATE
CULTURE CENTER RESTROOM OFF
0 CONTROL GROUP
OPERATION

Fig. 7c

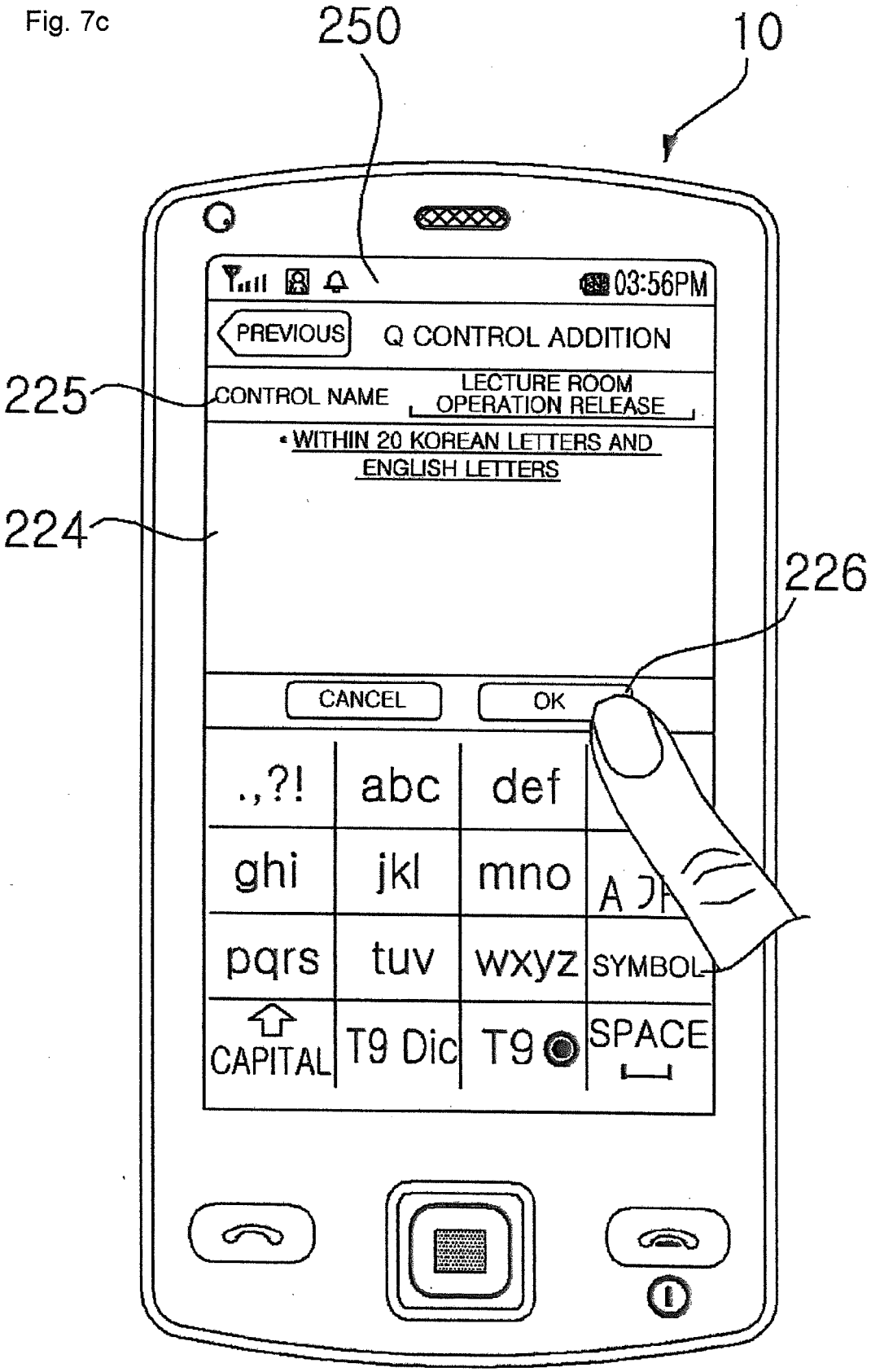

250
10
03:56PM
PREVIOUS
Q CONTROL ADDITION
225
CONTROL NAME
LECTURE ROOM OPERATION RELEASE
• WITHIN 20 KOREAN LETTERS AND ENGLISH LETTERS
224
226
CANCEL
OK
.,?!
abc
def
ghi
jkl
mno
pqrs
tuv
wxyz
SYMBOL
CAPITAL
T9 Dic
T9
SPACE

Fig. 7d

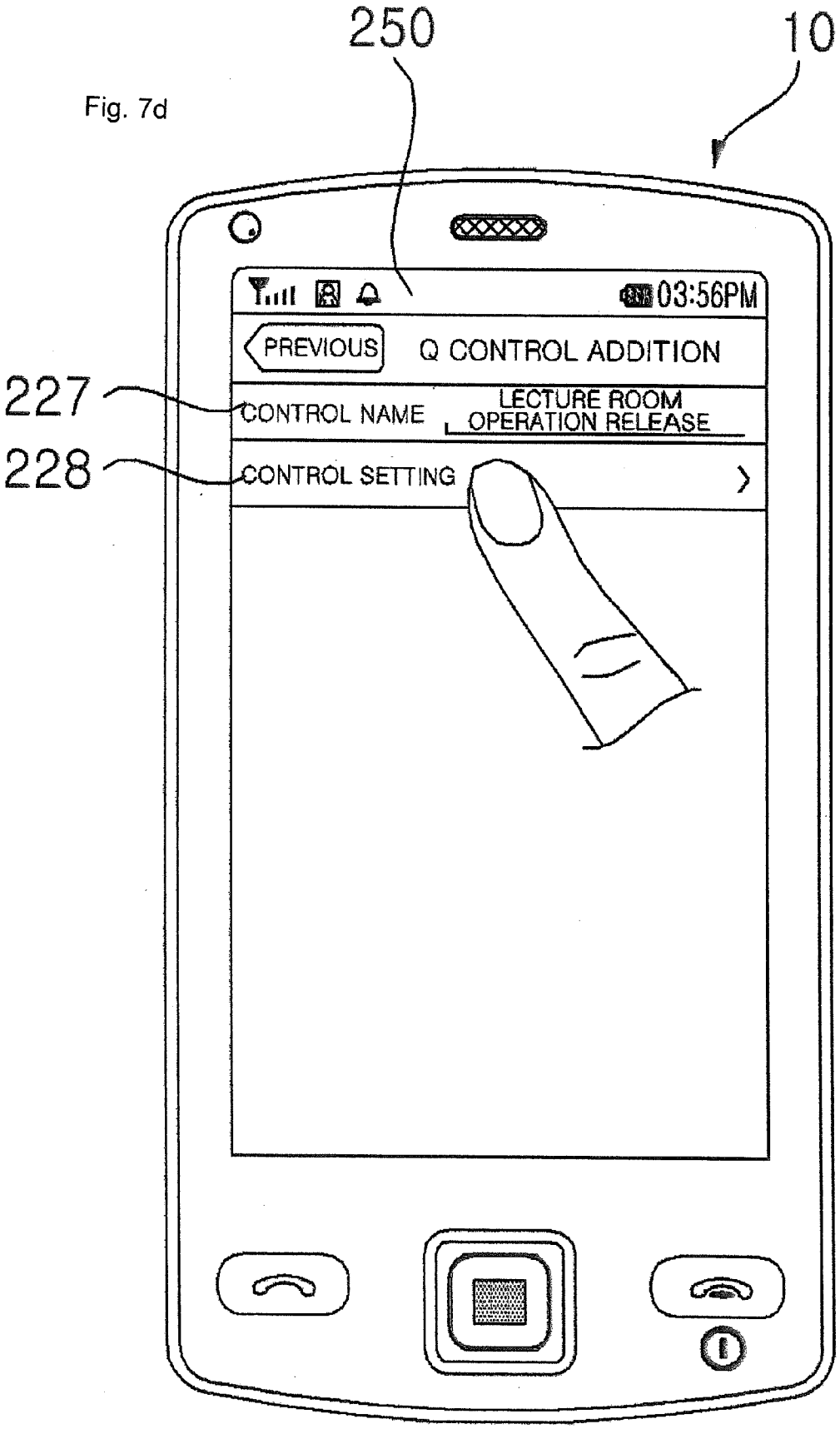

250
10
227
228
03:56PM
PREVIOUS
Q CONTROL ADDITION
CONTROL NAME
LECTURE ROOM OPERATION RELEASE
CONTROL SETTING

Fig. 7e

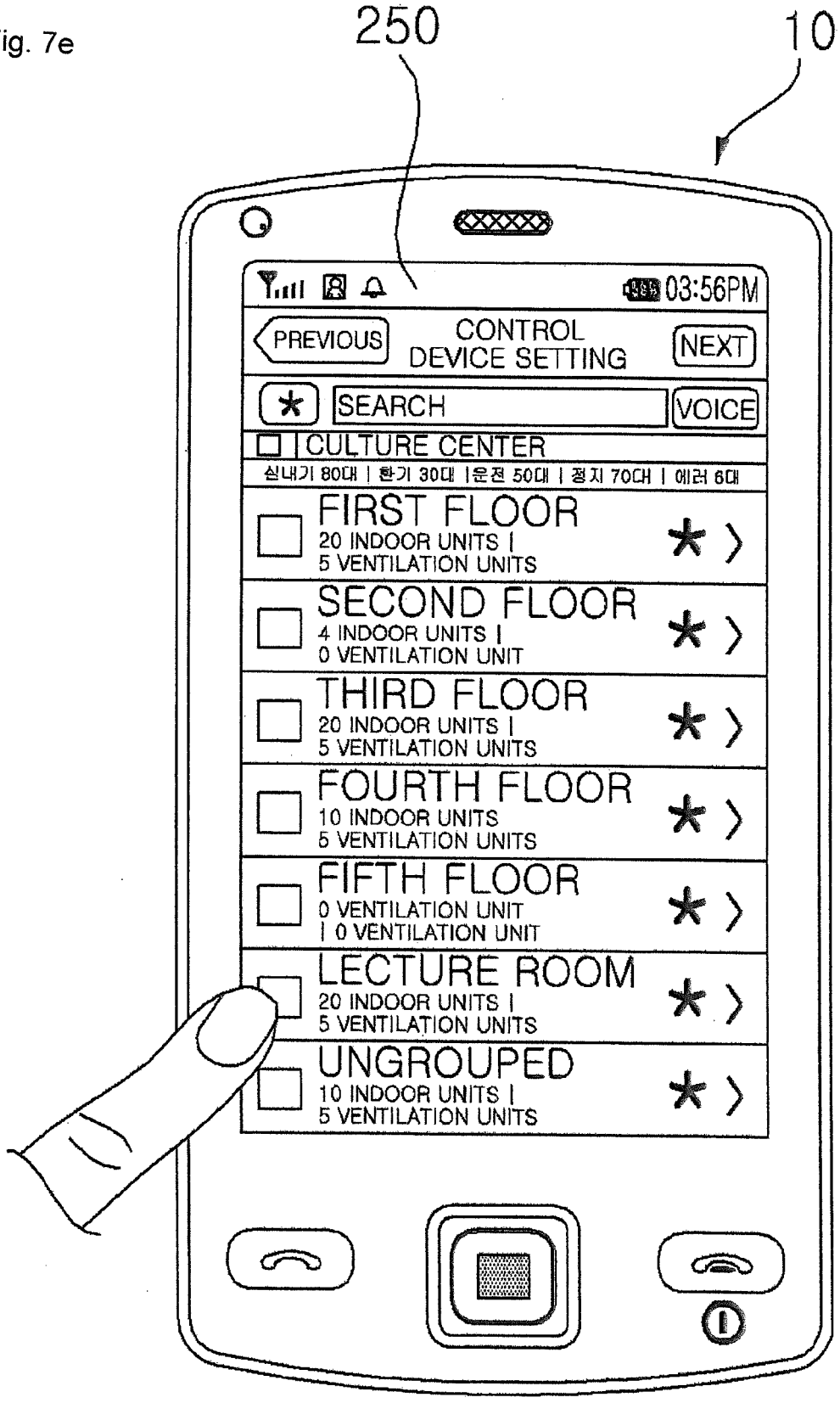

250
10
03:56PM
PREVIOUS
CONTROL DEVICE SETTING
NEXT
SEARCH
VOICE
CULTURE CENTER
실내기 80대 | 환기 30대 | 운전 50대 | 정지 70대 | 에러 6대
FIRST FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
SECOND FLOOR
4 INDOOR UNITS |
0 VENTILATION UNIT
THIRD FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
FOURTH FLOOR
10 INDOOR UNITS
5 VENTILATION UNITS
FIFTH FLOOR
0 VENTILATION UNIT
| 0 VENTILATION UNIT
LECTURE ROOM
20 INDOOR UNITS |
5 VENTILATION UNITS
UNGROUPED
10 INDOOR UNITS |
5 VENTILATION UNITS

Fig. 7f

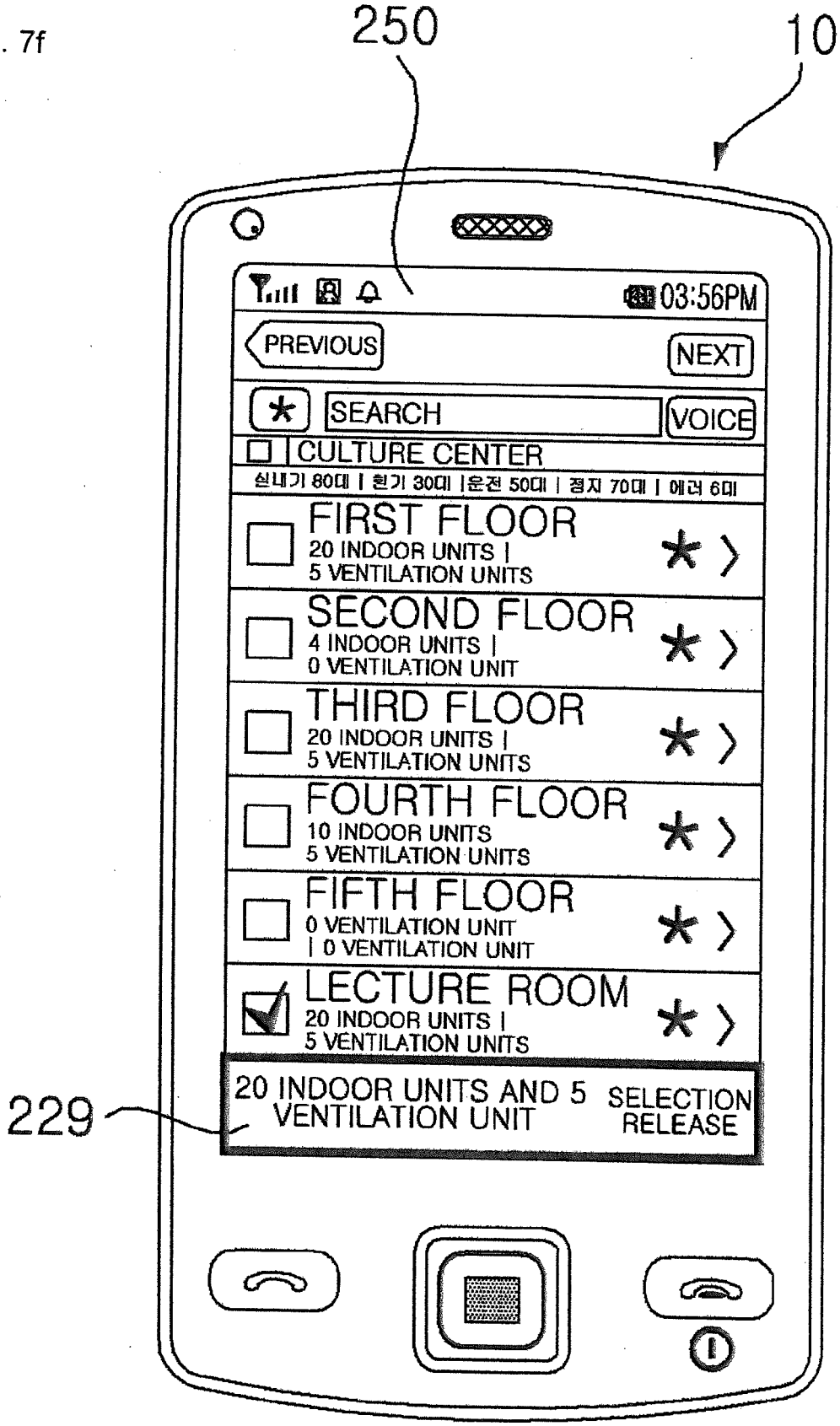

250
10
03:56PM
PREVIOUS
NEXT
SEARCH
VOICE
CULTURE CENTER
실내기 80대 | 환기 30대 | 운전 50대 | 정지 70대 | 에러 6대
FIRST FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
SECOND FLOOR
4 INDOOR UNITS |
0 VENTILATION UNIT
THIRD FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
FOURTH FLOOR
10 INDOOR UNITS
5 VENTILATION UNITS
FIFTH FLOOR
0 VENTILATION UNIT
| 0 VENTILATION UNIT
LECTURE ROOM
20 INDOOR UNITS |
5 VENTILATION UNITS
229
20 INDOOR UNITS AND 5 VENTILATION UNIT
SELECTION RELEASE

Fig. 8a

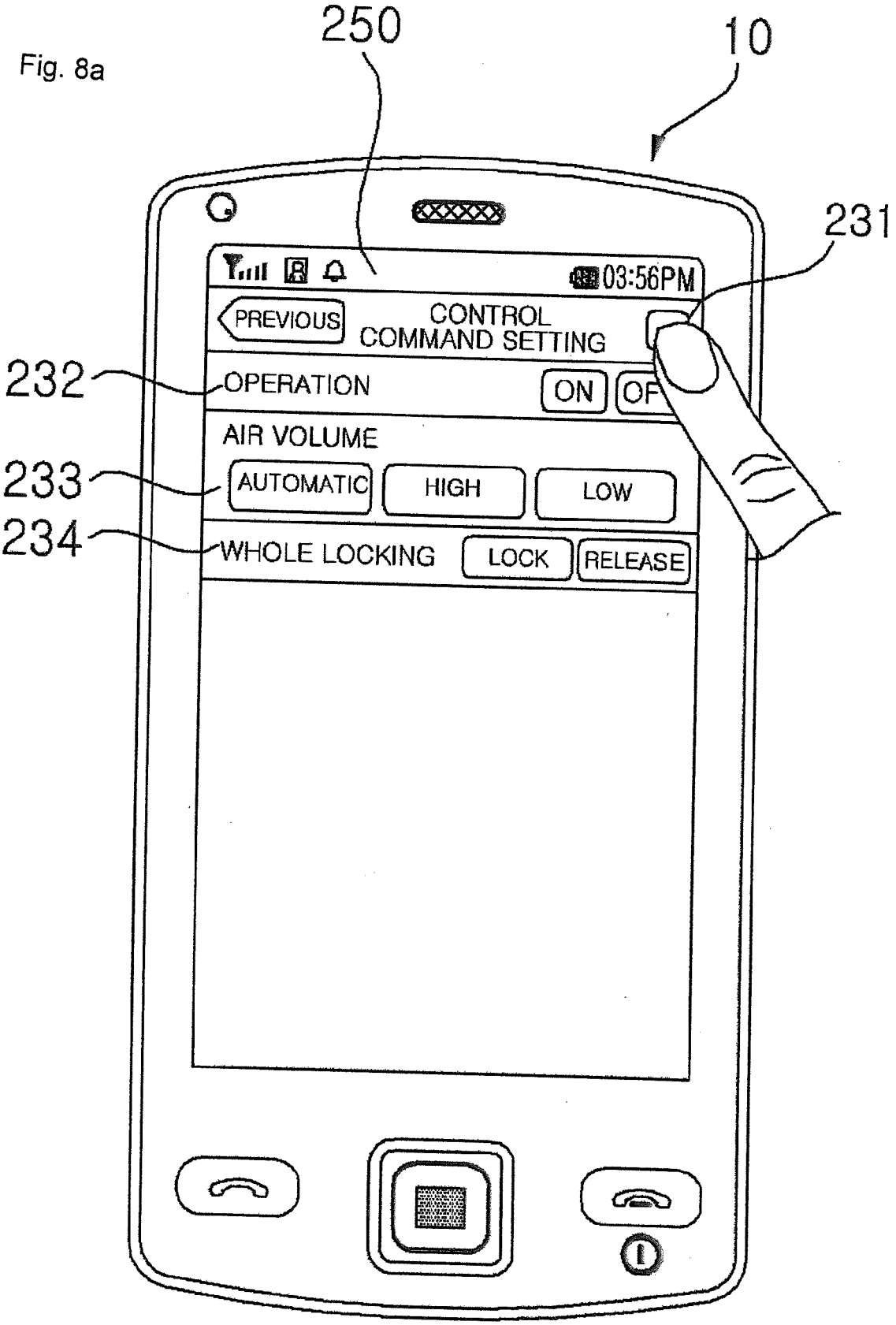

250
10
231
232
233
234
03:56PM
PREVIOUS
CONTROL
COMMAND SETTING
OPERATION
ON
OF
AIR VOLUME
AUTOMATIC
HIGH
LOW
WHOLE LOCKING
LOCK
RELEASE

Fig. 8b

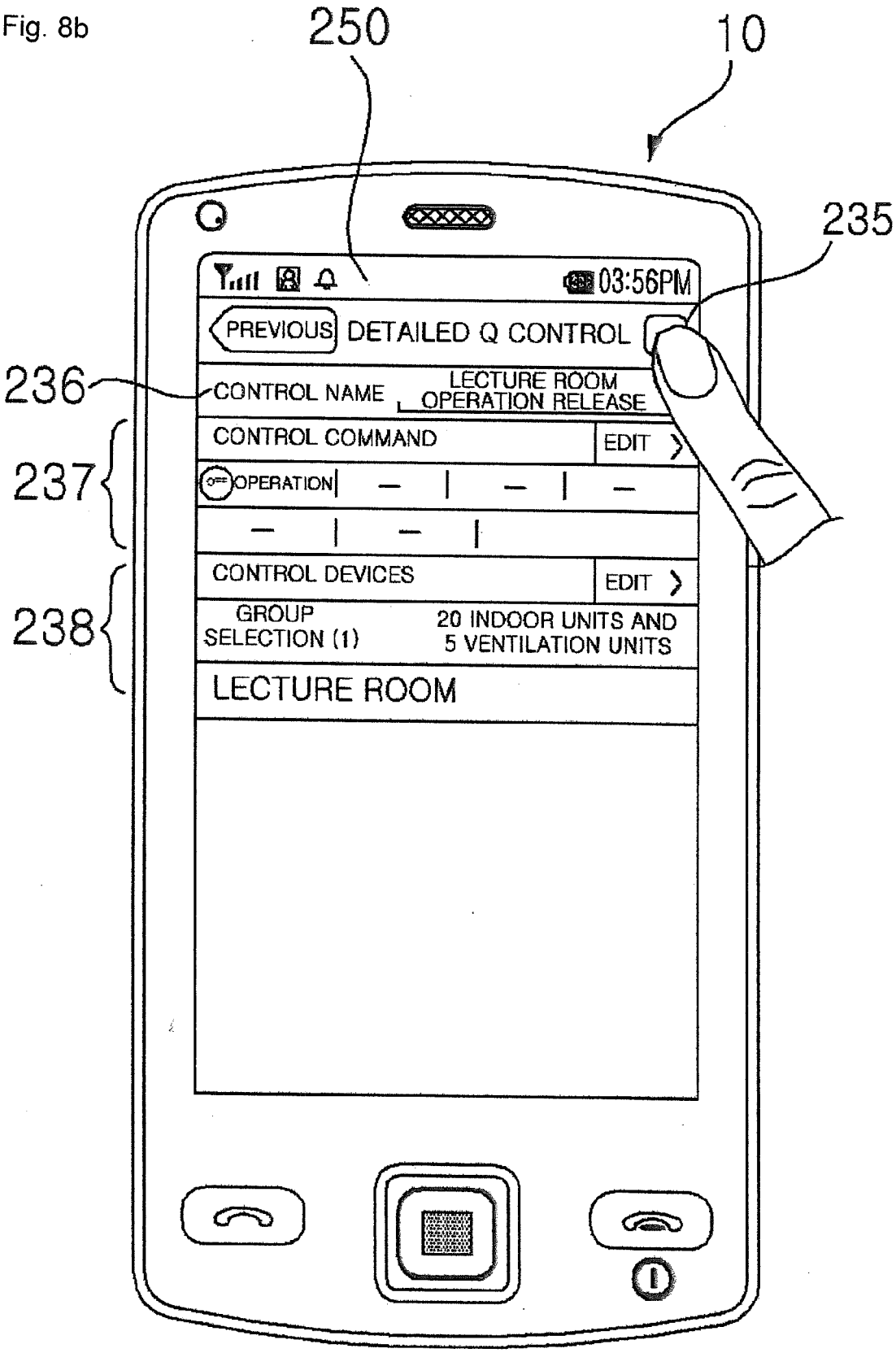

250
10
235
03:56PM
PREVIOUS
DETAILED Q CONTROL
236
CONTROL NAME
LECTURE ROOM OPERATION RELEASE
CONTROL COMMAND
EDIT
237
OPERATION
238
CONTROL DEVICES
EDIT
GROUP SELECTION (1)
20 INDOOR UNITS AND 5 VENTILATION UNITS
LECTURE ROOM

Fig. 8c

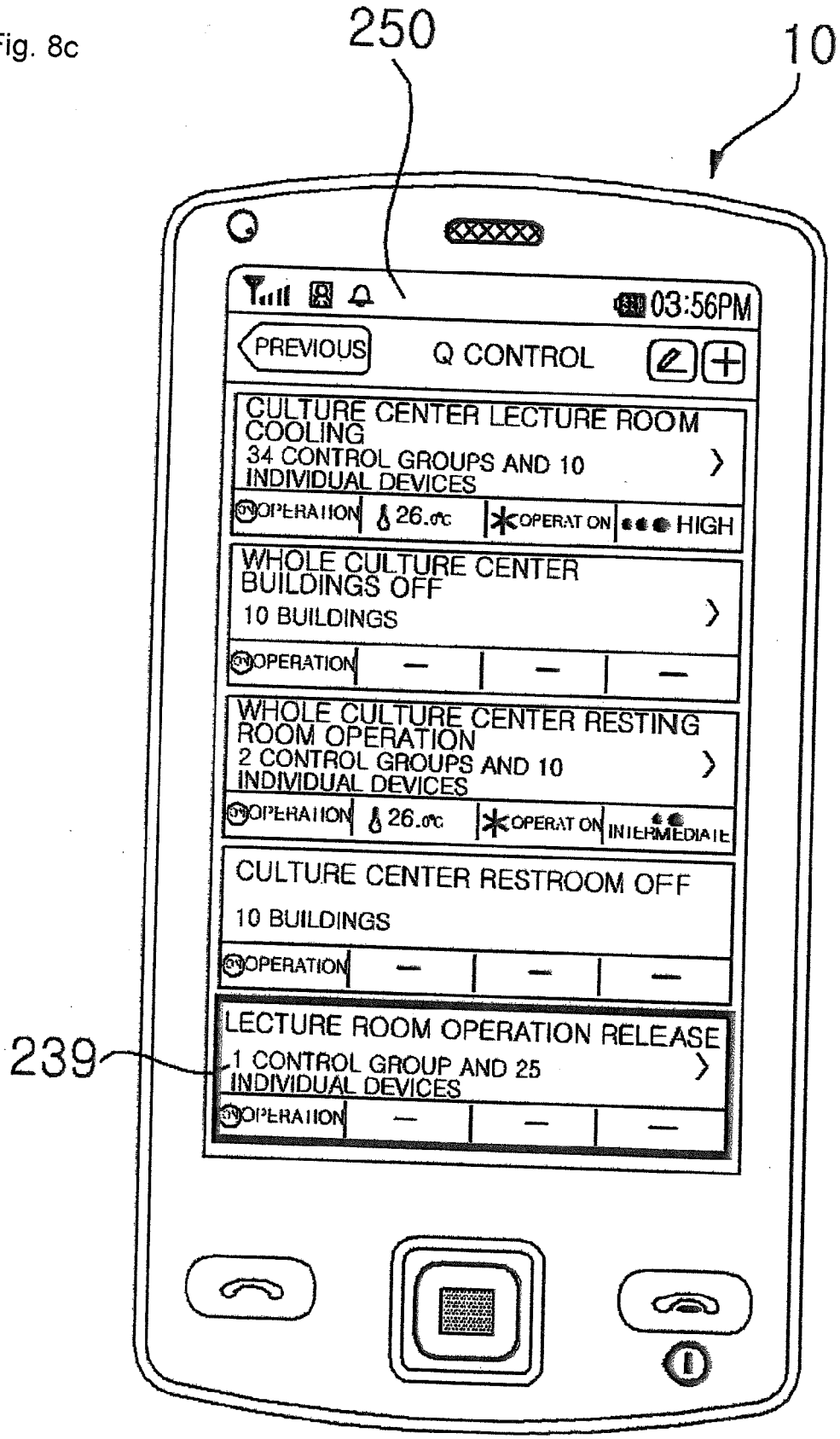

250
10
239
03:56PM
PREVIOUS
Q CONTROL
CULTURE CENTER LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
26.0℃
OPERATION
HIGH
WHOLE CULTURE CENTER BUILDINGS OFF
10 BUILDINGS
OPERATION
WHOLE CULTURE CENTER RESTING ROOM OPERATION
2 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
26.0℃
OPERATION
INTERMEDIATE
CULTURE CENTER RESTROOM OFF
10 BUILDINGS
OPERATION
LECTURE ROOM OPERATION RELEASE
1 CONTROL GROUP AND 25 INDIVIDUAL DEVICES
OPERATION

Fig. 9a

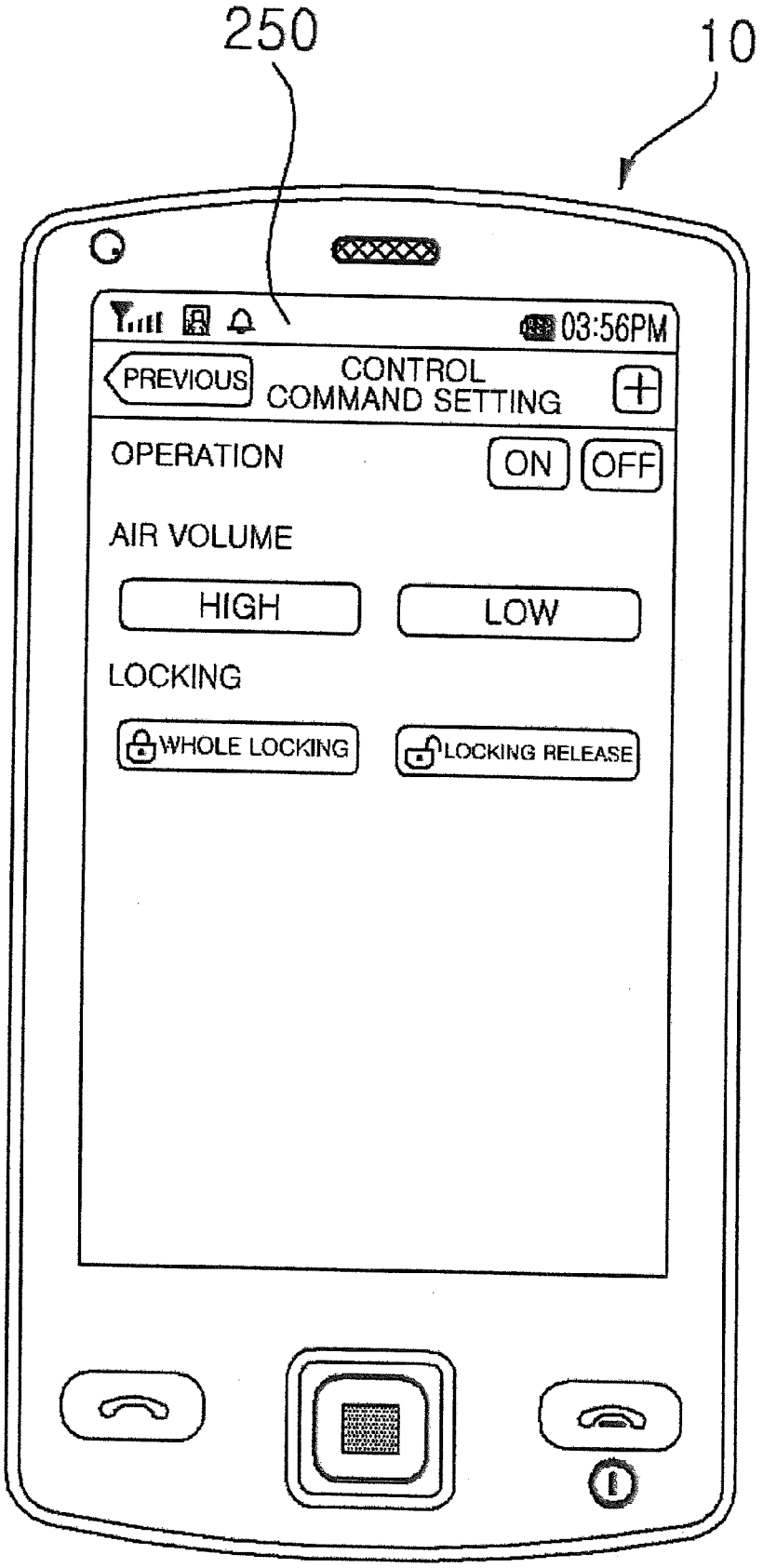

250
10
03:56PM
PREVIOUS
CONTROL
COMMAND SETTING
OPERATION
ON
OFF
AIR VOLUME
HIGH
LOW
LOCKING
WHOLE LOCKING
LOCKING RELEASE

Fig. 9b

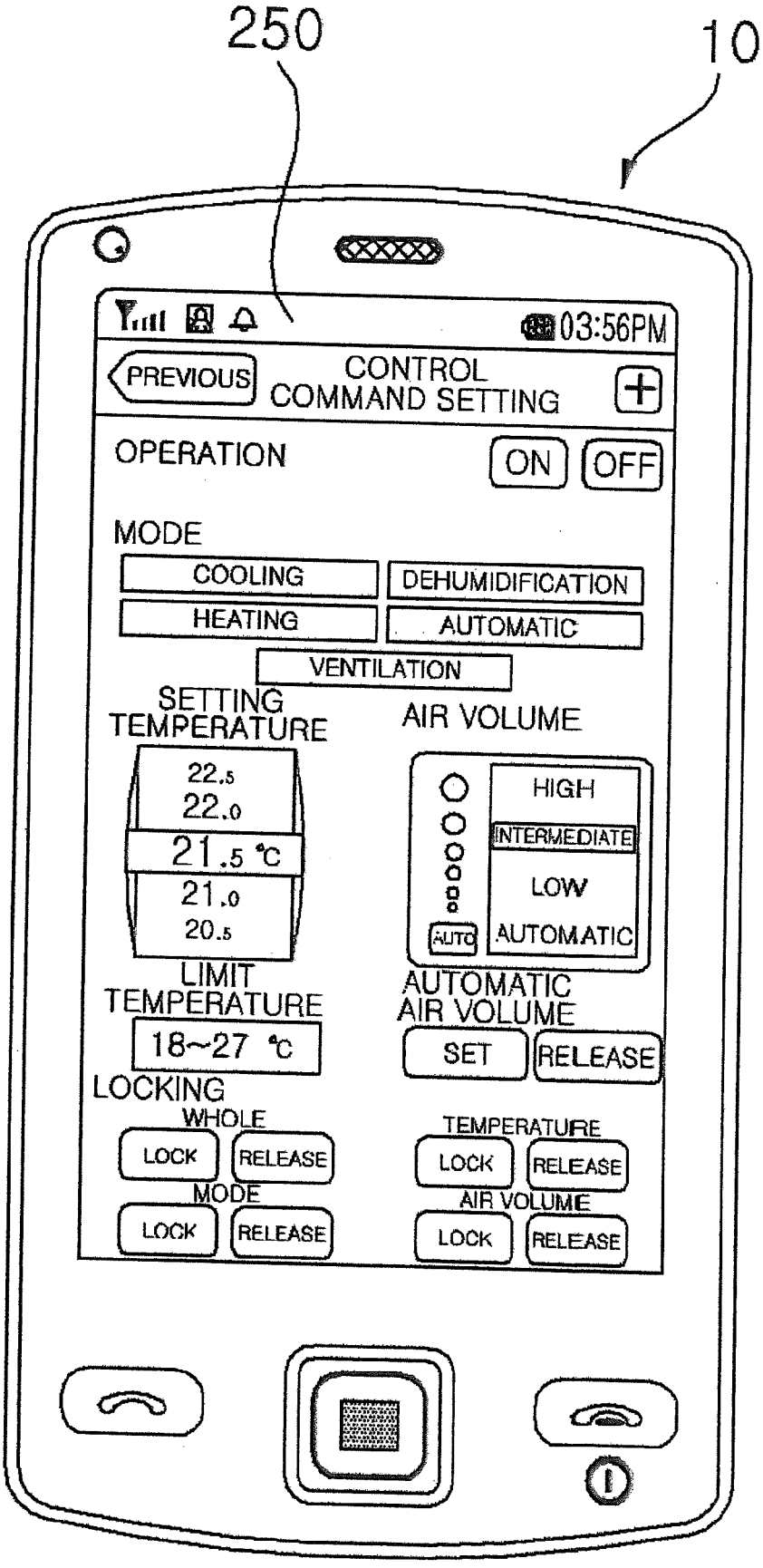

250
10
03:56PM
PREVIOUS
CONTROL COMMAND SETTING
OPERATION
ON
OFF
MODE
COOLING
DEHUMIDIFICATION
HEATING
AUTOMATIC
VENTILATION
SETTING TEMPERATURE
22.5
22.0
21.5 ℃
21.0
20.5
AIR VOLUME
HIGH
INTERMEDIATE
LOW
AUTO
AUTOMATIC
LIMIT TEMPERATURE
18~27 ℃
AUTOMATIC AIR VOLUME
SET
RELEASE
LOCKING
WHOLE
LOCK
RELEASE
MODE
LOCK
RELEASE
TEMPERATURE
LOCK
RELEASE
AIR VOLUME
LOCK
RELEASE

Fig. 9c

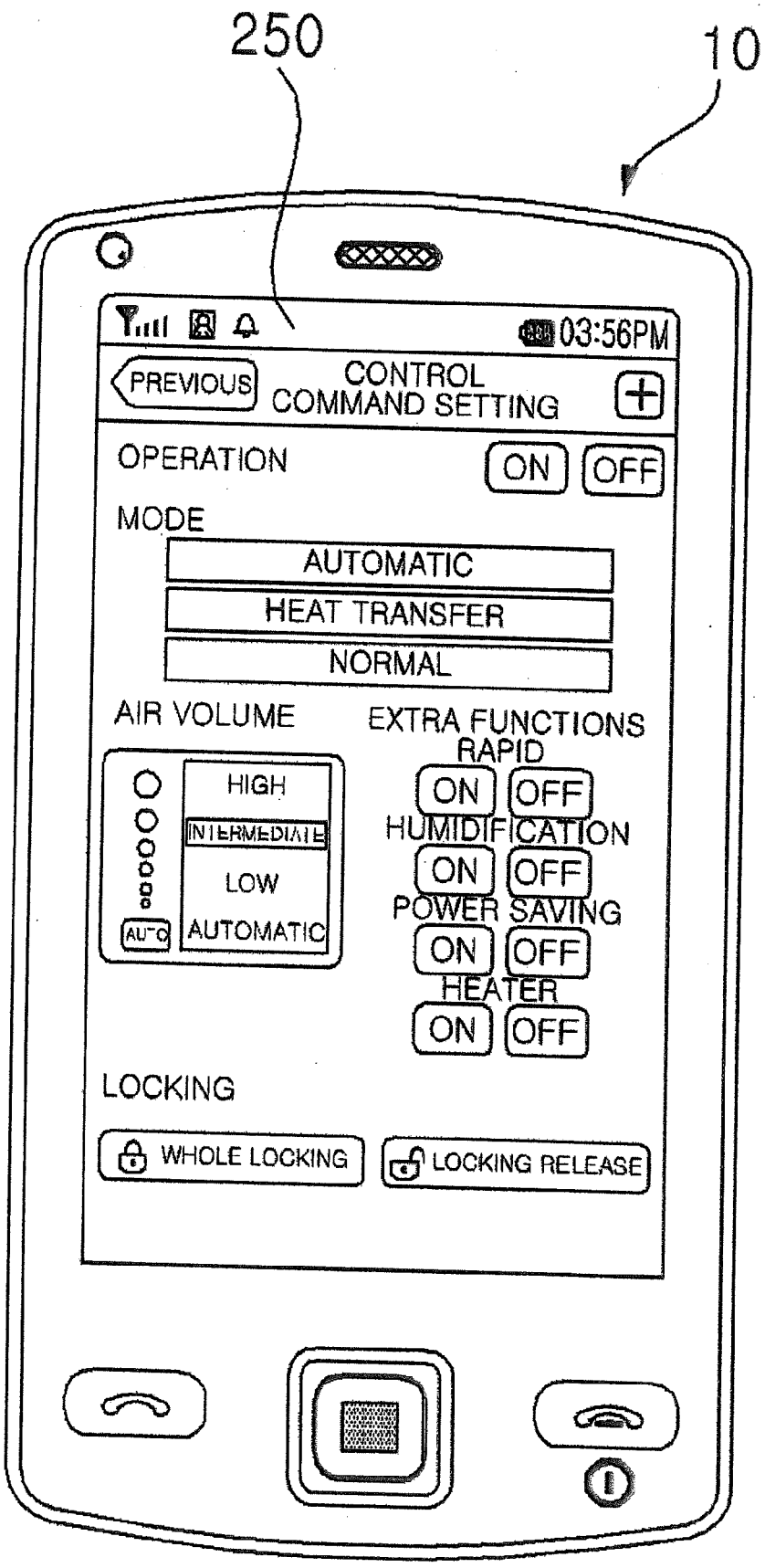

250
10
03:56PM
PREVIOUS
CONTROL COMMAND SETTING
OPERATION
ON
OFF
MODE
AUTOMATIC
HEAT TRANSFER
NORMAL
AIR VOLUME
HIGH
INTERMEDIATE
LOW
AUTOMATIC
EXTRA FUNCTIONS
RAPID
ON
OFF
HUMIDIFICATION
ON
OFF
POWER SAVING
ON
OFF
HEATER
ON
OFF
LOCKING
WHOLE LOCKING
LOCKING RELEASE

Fig. 9d

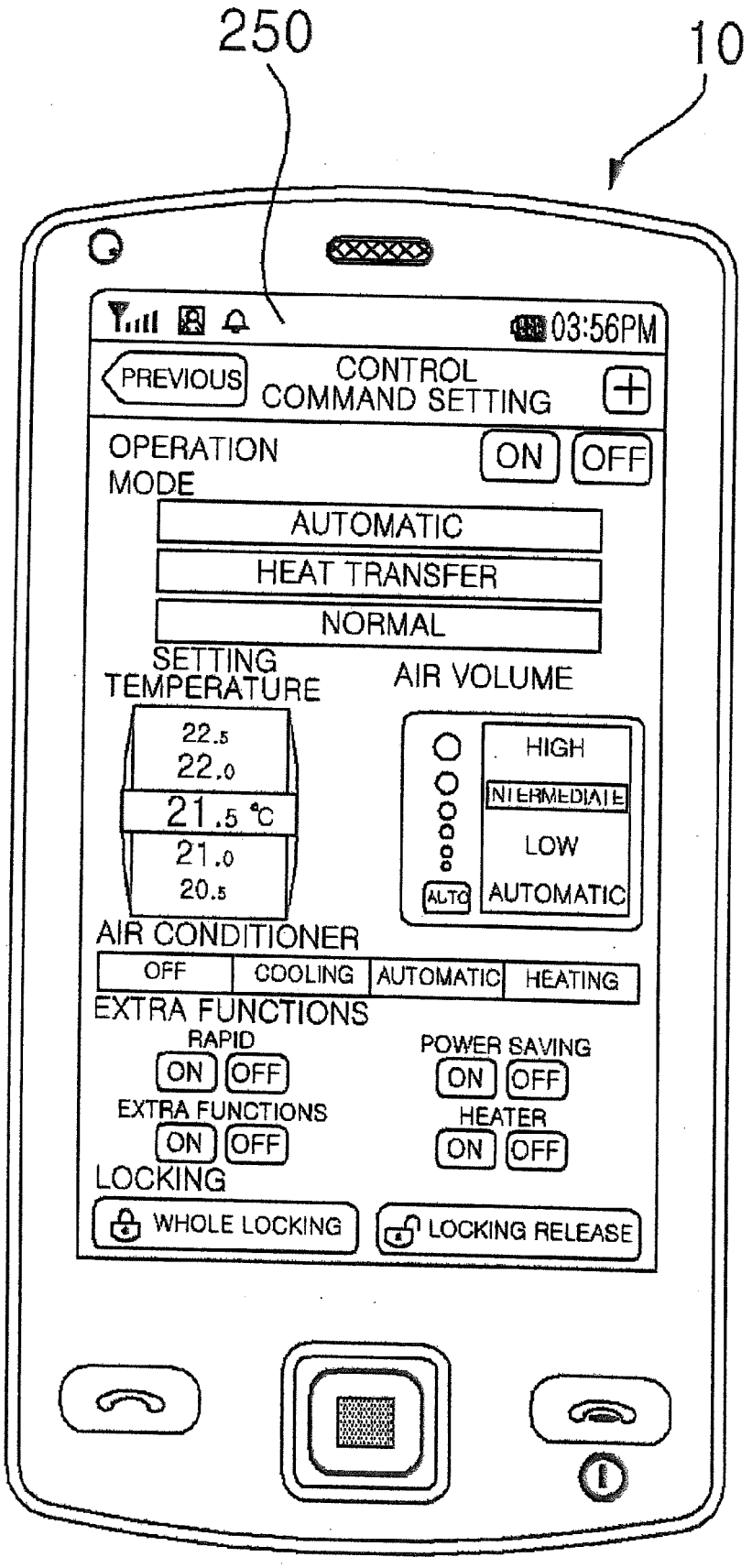

250
10
03:56PM
PREVIOUS
CONTROL COMMAND SETTING
OPERATION MODE
ON
OFF
AUTOMATIC
HEAT TRANSFER
NORMAL
SETTING TEMPERATURE
AIR VOLUME
22.5
22.0
21.5 ℃
21.0
20.5
HIGH
INTERMEDIATE
LOW
AUTOMATIC
AIR CONDITIONER
OFF
COOLING
AUTOMATIC
HEATING
EXTRA FUNCTIONS
RAPID
ON
OFF
POWER SAVING
ON
OFF
EXTRA FUNCTIONS
ON
OFF
HEATER
ON
OFF
LOCKING
WHOLE LOCKING
LOCKING RELEASE

Fig. 10a

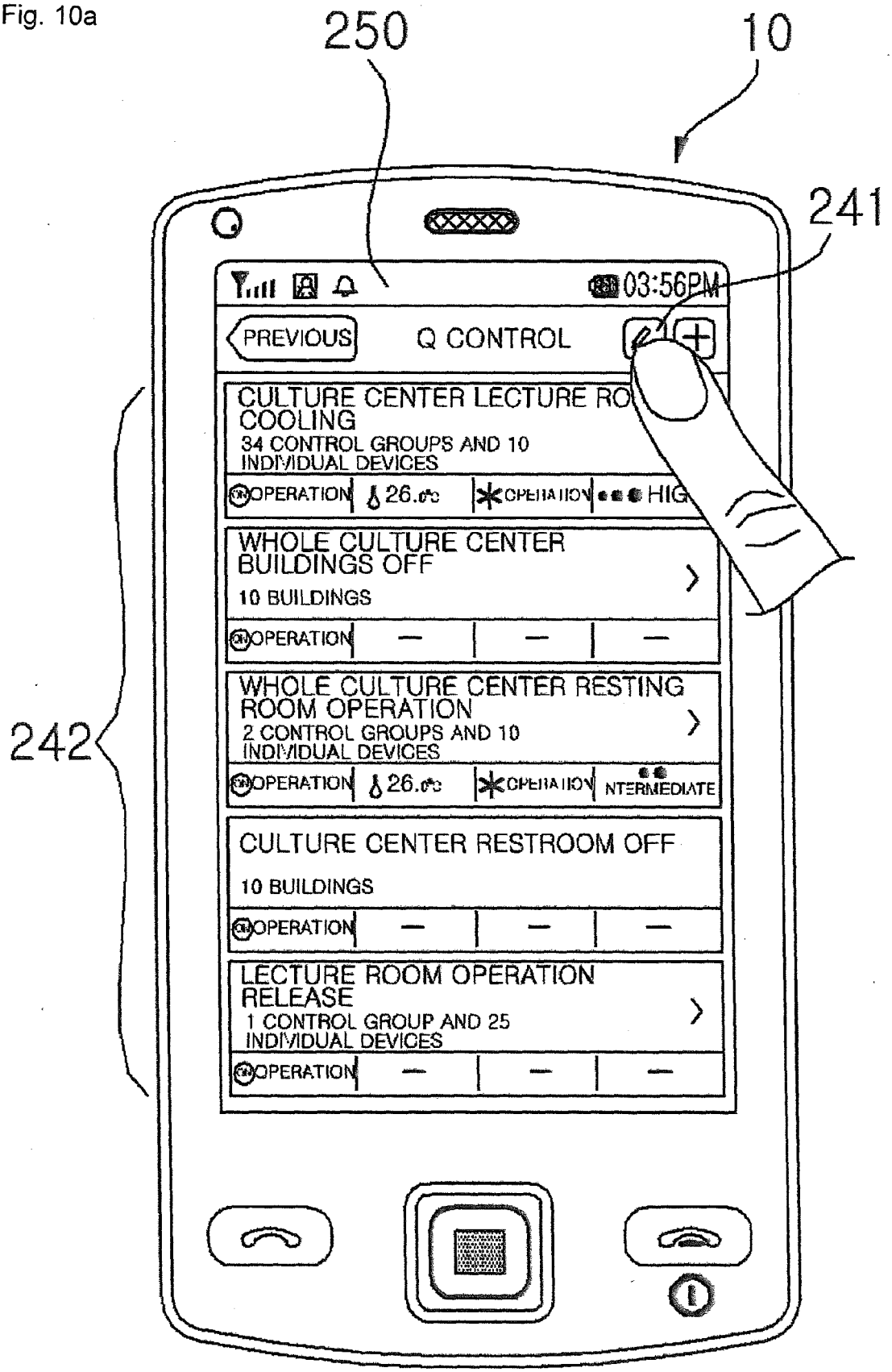

250
10
241
242
03:56PM
PREVIOUS
Q CONTROL
CULTURE CENTER LECTURE RO
COOLING
34 CONTROL GROUPS AND 10
INDIVIDUAL DEVICES
OPERATION
26.
OPERATION
HIG
WHOLE CULTURE CENTER
BUILDINGS OFF
10 BUILDINGS
OPERATION
WHOLE CULTURE CENTER RESTING
ROOM OPERATION
2 CONTROL GROUPS AND 10
INDIVIDUAL DEVICES
OPERATION
26.
OPERATION
INTERMEDIATE
CULTURE CENTER RESTROOM OFF
10 BUILDINGS
OPERATION
LECTURE ROOM OPERATION
RELEASE
1 CONTROL GROUP AND 25
INDIVIDUAL DEVICES
OPERATION

Fig. 10b

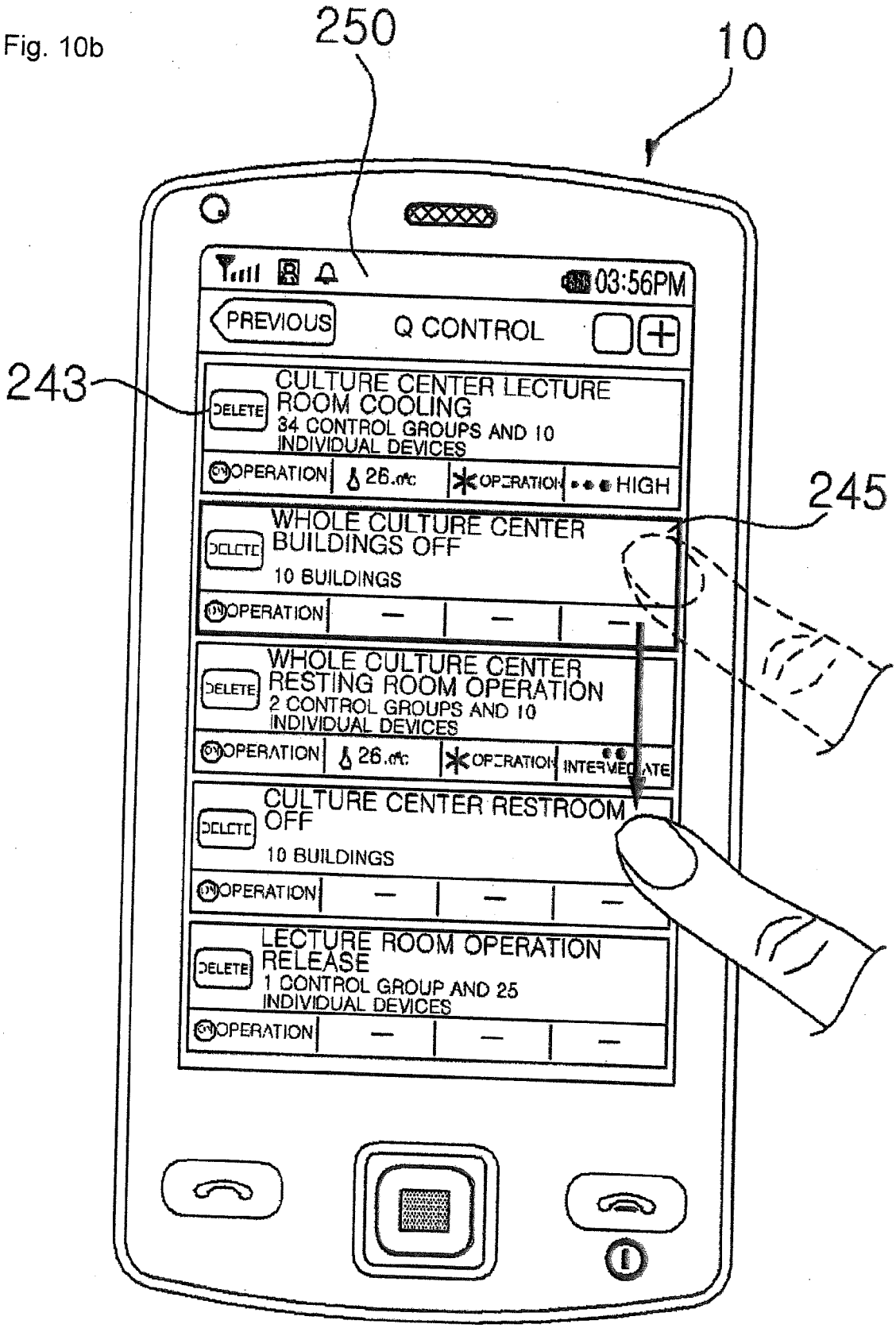

250
10
243
245
03:56PM
PREVIOUS
Q CONTROL
DELETE
CULTURE CENTER LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
26.0°C
OPERATION
HIGH
DELETE
WHOLE CULTURE CENTER BUILDINGS OFF
10 BUILDINGS
ON OPERATION
DELETE
WHOLE CULTURE CENTER RESTING ROOM OPERATION
2 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
26.0°C
OPERATION
DELETE
CULTURE CENTER RESTROOM OFF
10 BUILDINGS
ON OPERATION
DELETE
LECTURE ROOM OPERATION RELEASE
1 CONTROL GROUP AND 25 INDIVIDUAL DEVICES
ON OPERATION

Fig. 10c

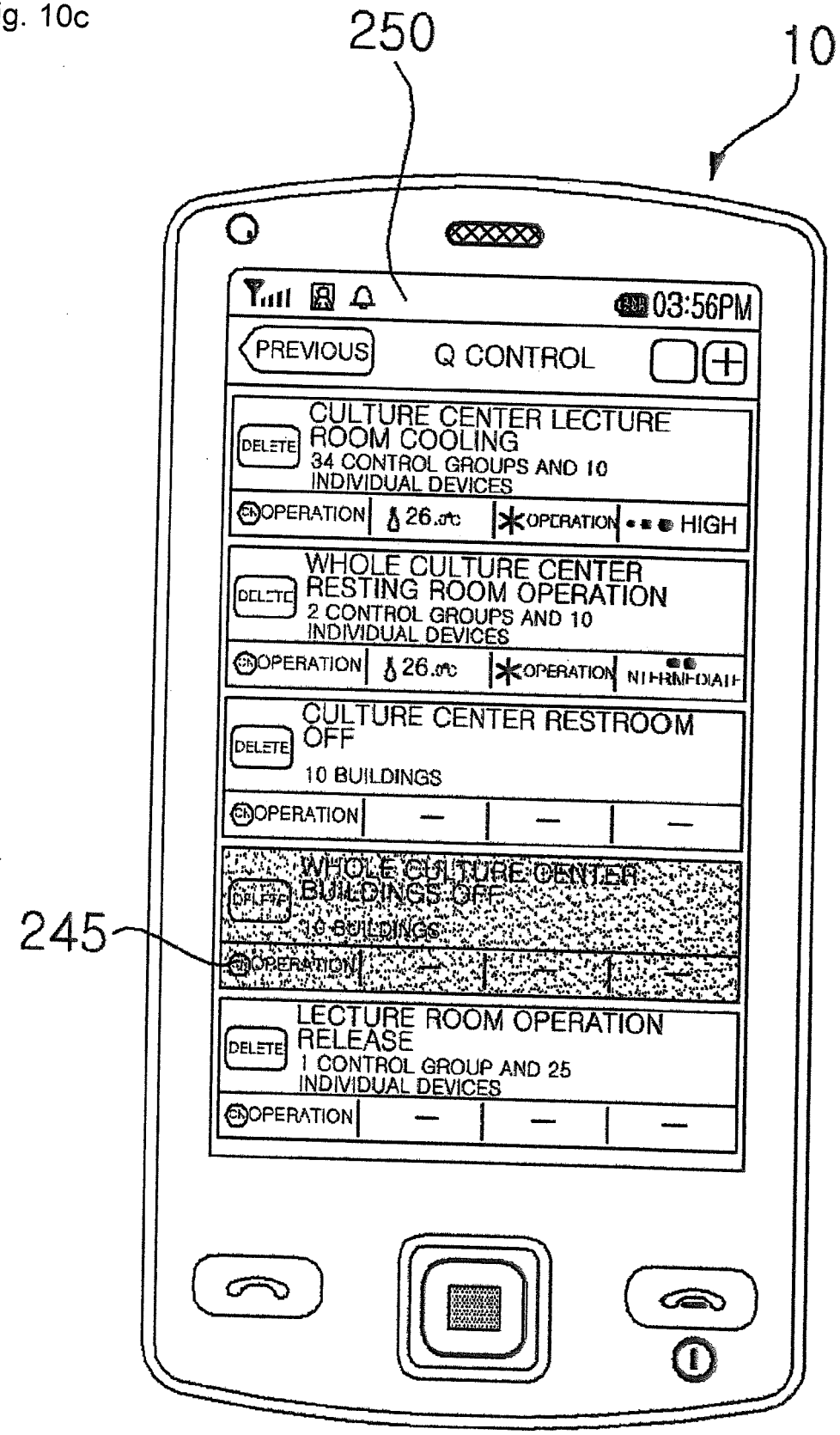

250
10
245
03:56PM
PREVIOUS
Q CONTROL
DELETE
CULTURE CENTER LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
26.0℃
OPERATION
HIGH
DELETE
WHOLE CULTURE CENTER RESTING ROOM OPERATION
2 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
26.0℃
OPERATION
DELETE
CULTURE CENTER RESTROOM OFF
10 BUILDINGS
ON OPERATION
WHOLE CULTURE CENTER BUILDINGS OFF
10 BUILDINGS
ON OPERATION
DELETE
LECTURE ROOM OPERATION RELEASE
1 CONTROL GROUP AND 25 INDIVIDUAL DEVICES
ON OPERATION

Fig. 11a

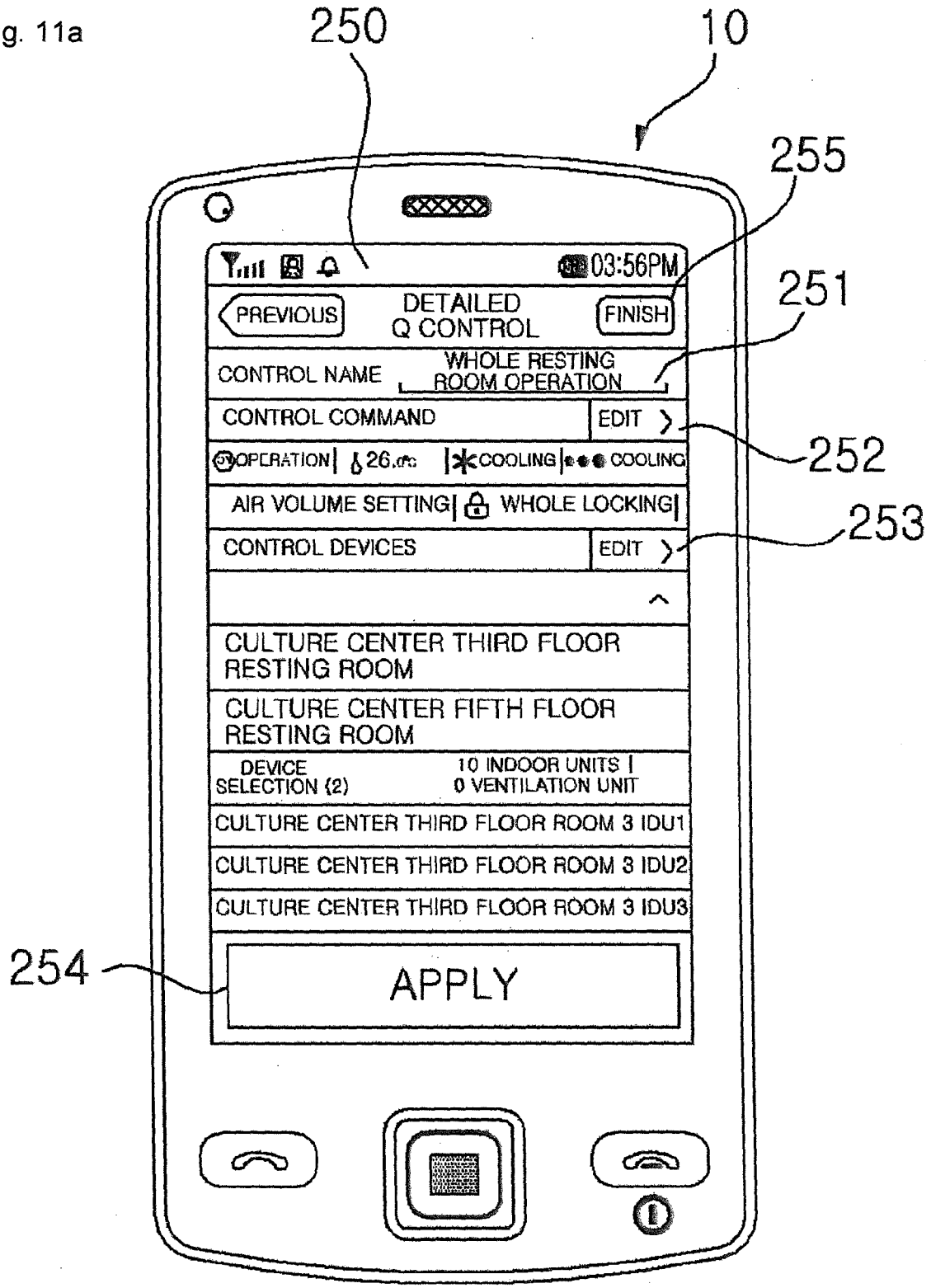

250
10
255
251
252
253
254
03:56PM
PREVIOUS
DETAILED Q CONTROL
FINISH
CONTROL NAME
WHOLE RESTING ROOM OPERATION
CONTROL COMMAND
EDIT
OPERATION
26
COOLING
COOLING
AIR VOLUME SETTING
WHOLE LOCKING
CONTROL DEVICES
EDIT
CULTURE CENTER THIRD FLOOR RESTING ROOM
CULTURE CENTER FIFTH FLOOR RESTING ROOM
DEVICE SELECTION (2)
10 INDOOR UNITS
0 VENTILATION UNIT
CULTURE CENTER THIRD FLOOR ROOM 3 IDU1
CULTURE CENTER THIRD FLOOR ROOM 3 IDU2
CULTURE CENTER THIRD FLOOR ROOM 3 IDU3
APPLY

Fig. 11b

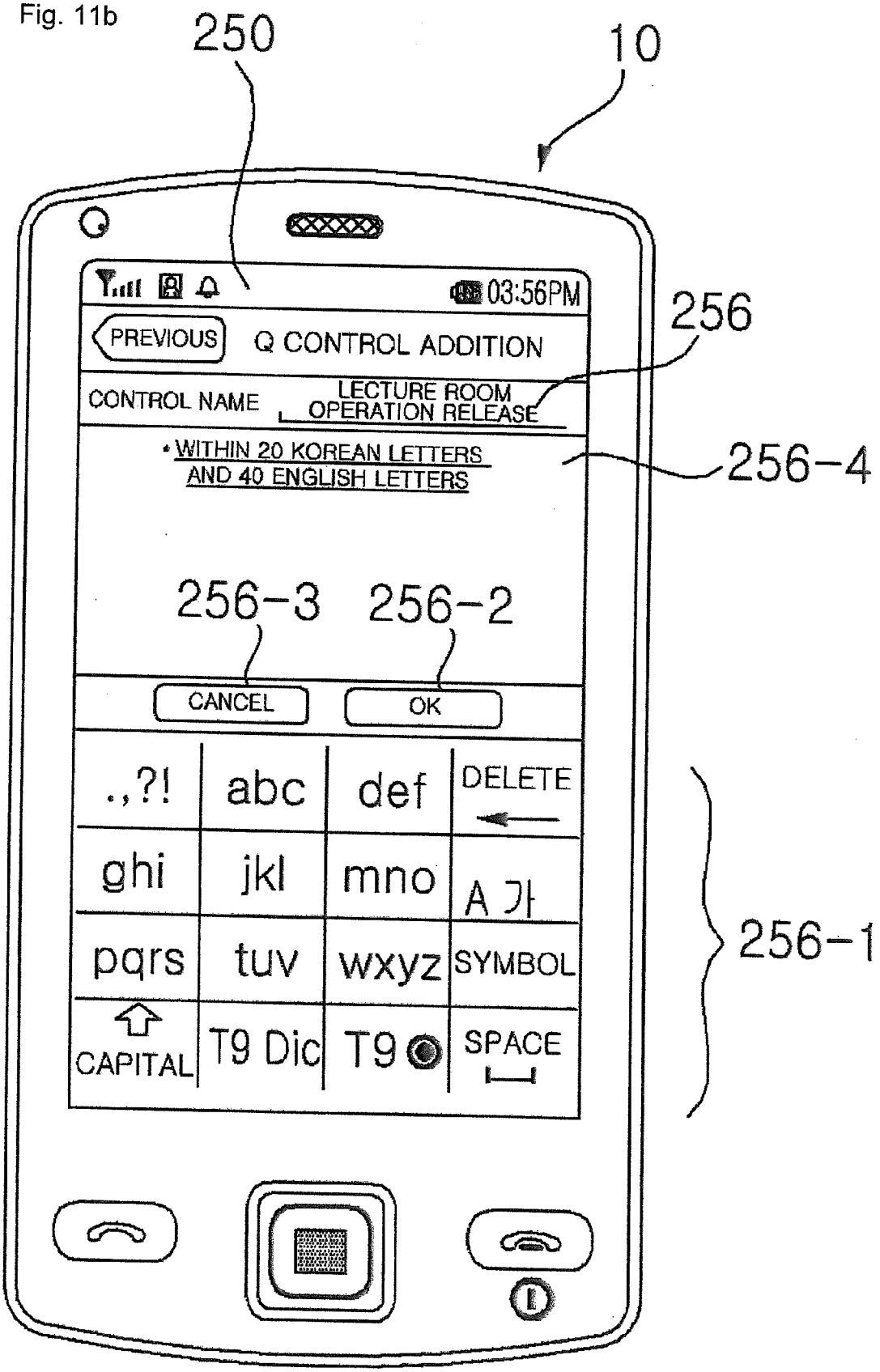

250
10
03:56PM
256
PREVIOUS
Q CONTROL ADDITION
CONTROL NAME
LECTURE ROOM OPERATION RELEASE
• WITHIN 20 KOREAN LETTERS AND 40 ENGLISH LETTERS
256-4
256-3
256-2
CANCEL
OK
.,?!
abc
def
DELETE
ghi
jkl
mno
A 가
pqrs
tuv
wxyz
SYMBOL
CAPITAL
T9 Dic
T9
SPACE
256-1

Fig. 11c

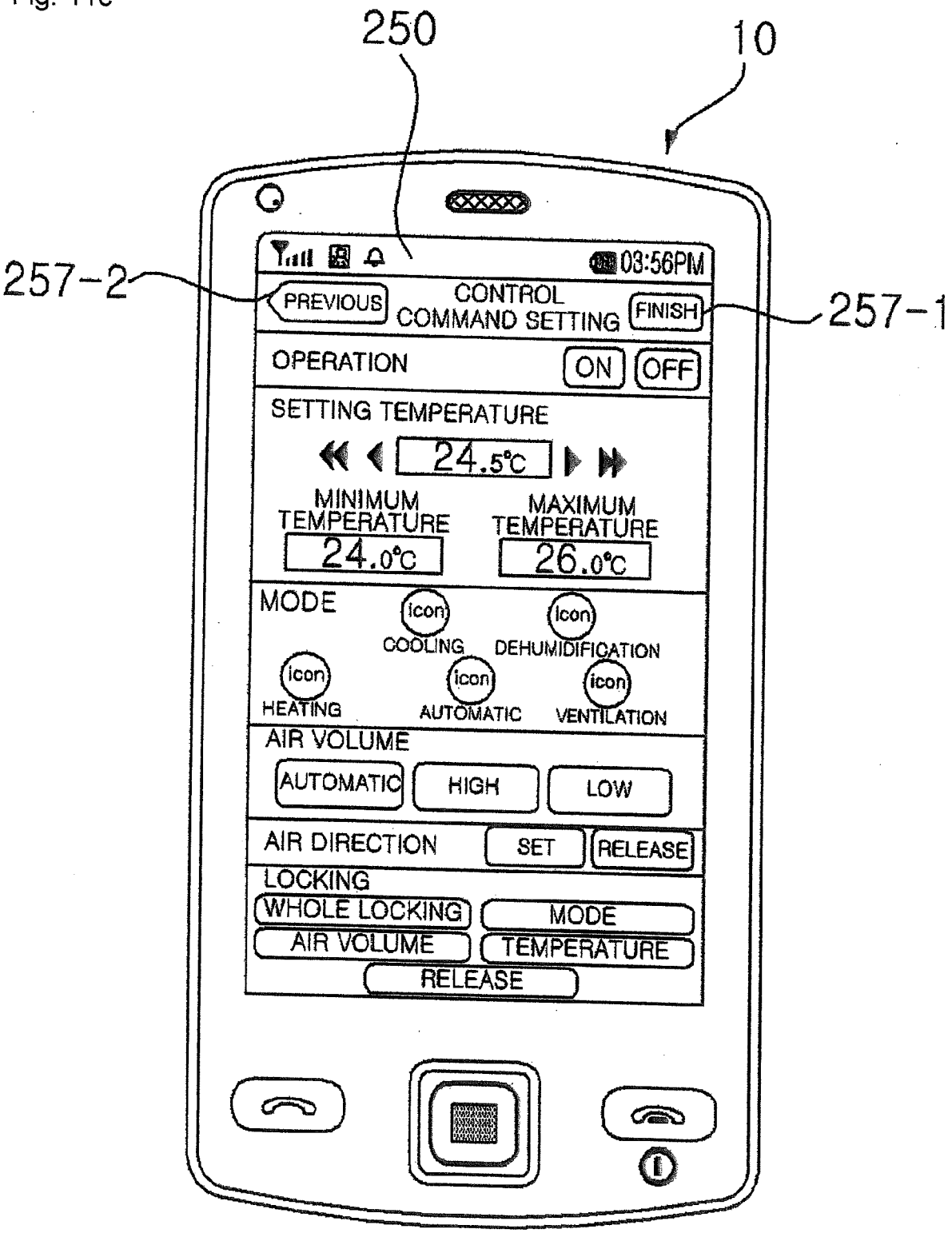

250
10
257-2
257-1
03:56PM
PREVIOUS
CONTROL COMMAND SETTING
FINISH
OPERATION
ON
OFF
SETTING TEMPERATURE
24.5℃
MINIMUM TEMPERATURE
24.0℃
MAXIMUM TEMPERATURE
26.0℃
MODE
icon
COOLING
DEHUMIDIFICATION
HEATING
AUTOMATIC
VENTILATION
AIR VOLUME
AUTOMATIC
HIGH
LOW
AIR DIRECTION
SET
RELEASE
LOCKING
WHOLE LOCKING
MODE
AIR VOLUME
TEMPERATURE
RELEASE

Fig. 11d

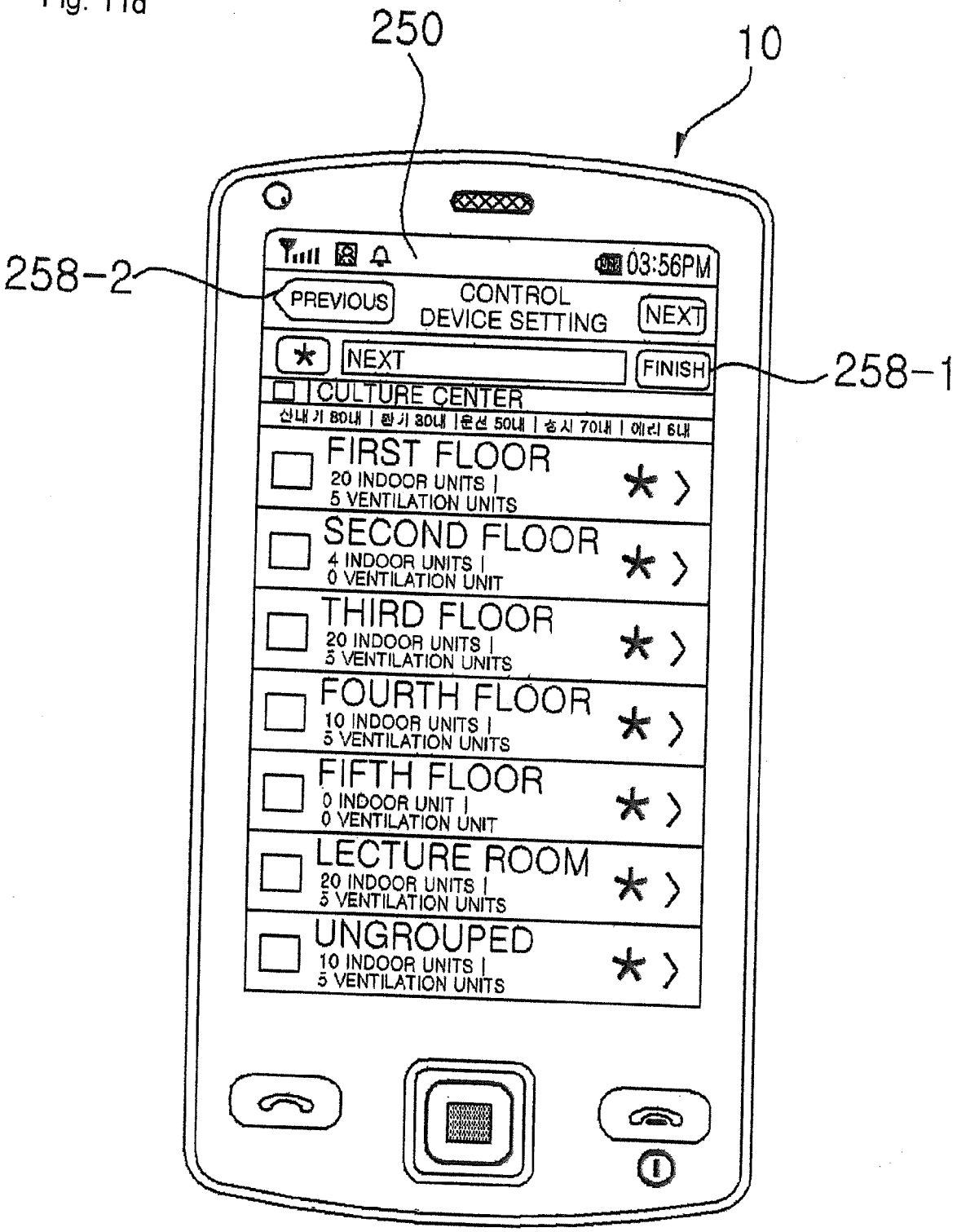

250
10
258-2
258-1
03:56PM
PREVIOUS
CONTROL
DEVICE SETTING
NEXT
NEXT
FINISH
CULTURE CENTER
FIRST FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
SECOND FLOOR
4 INDOOR UNITS |
0 VENTILATION UNIT
THIRD FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
FOURTH FLOOR
10 INDOOR UNITS |
5 VENTILATION UNITS
FIFTH FLOOR
0 INDOOR UNIT |
0 VENTILATION UNIT
LECTURE ROOM
20 INDOOR UNITS |
5 VENTILATION UNITS
UNGROUPED
10 INDOOR UNITS |
5 VENTILATION UNITS

Fig. 11e

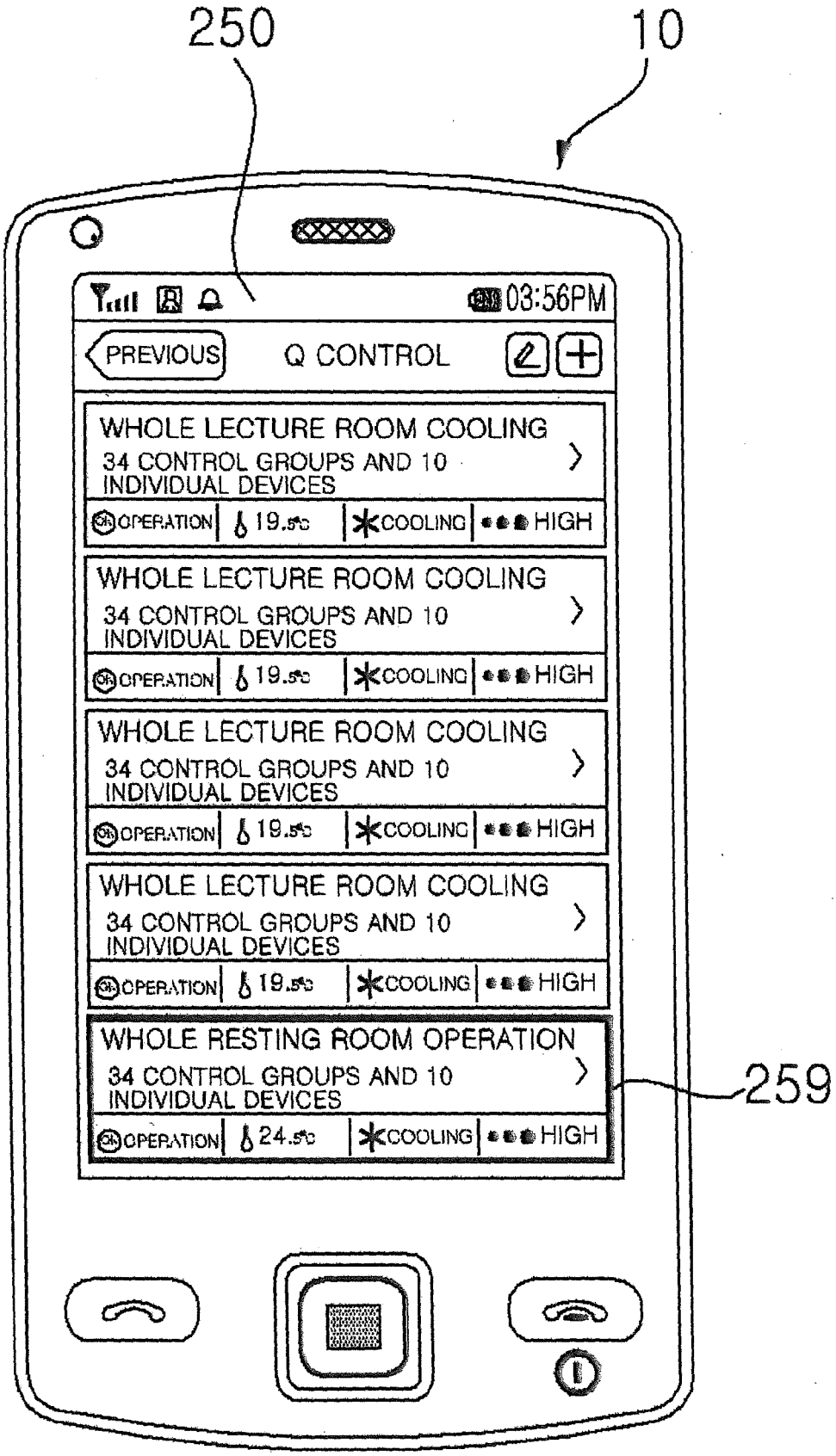

250
10
03:56PM
PREVIOUS
Q CONTROL
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
19.5℃
COOLING
HIGH
WHOLE RESTING ROOM OPERATION
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
OPERATION
24.5℃
COOLING
HIGH
259

Fig. 12a

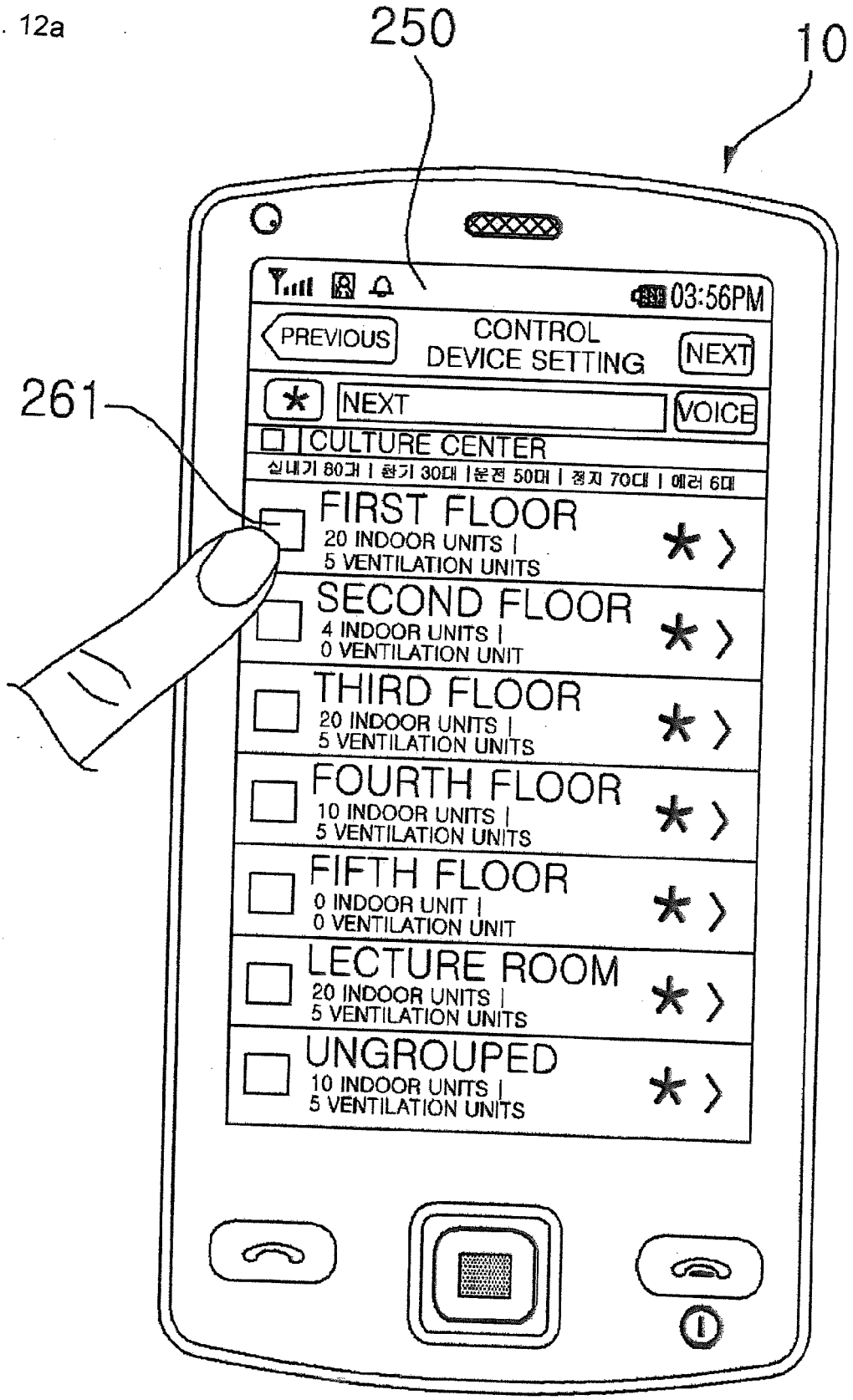

250
10
261
03:56PM
PREVIOUS
CONTROL DEVICE SETTING
NEXT
NEXT
VOICE
CULTURE CENTER
실내기 80대 | 환기 30대 | 온전 50대 | 정지 70대 | 에러 6대
FIRST FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
SECOND FLOOR
4 INDOOR UNITS |
0 VENTILATION UNIT
THIRD FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
FOURTH FLOOR
10 INDOOR UNITS |
5 VENTILATION UNITS
FIFTH FLOOR
0 INDOOR UNIT |
0 VENTILATION UNIT
LECTURE ROOM
20 INDOOR UNITS |
5 VENTILATION UNITS
UNGROUPED
10 INDOOR UNITS |
5 VENTILATION UNITS

Fig. 12b

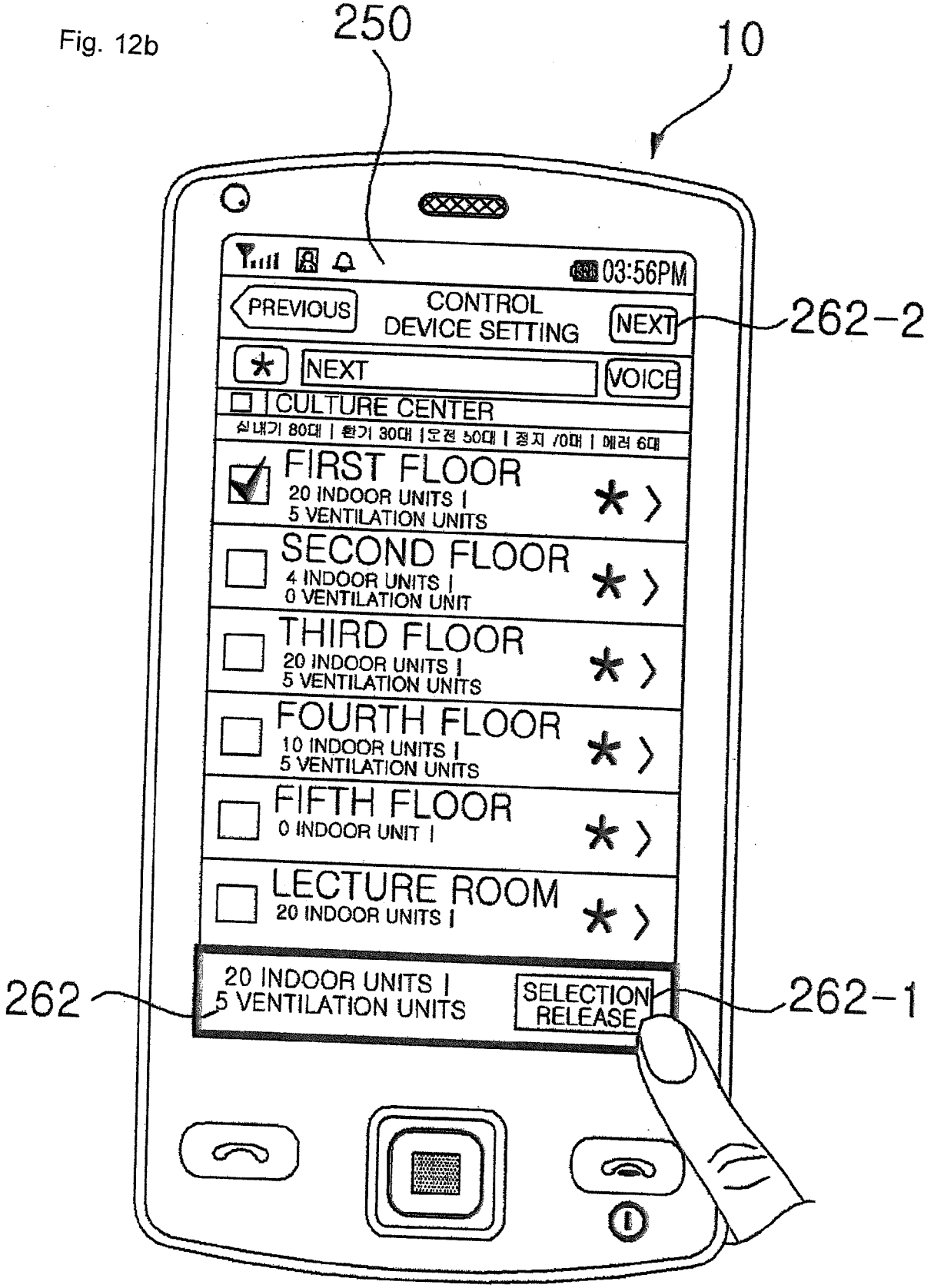

250
10
03:56PM
PREVIOUS
CONTROL DEVICE SETTING
NEXT
262-2
NEXT
VOICE
CULTURE CENTER
실내기 80대 | 환기 30대 | 온전 50대 | 정지 70대 | 에러 6대
FIRST FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
SECOND FLOOR
4 INDOOR UNITS |
0 VENTILATION UNIT
THIRD FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
FOURTH FLOOR
10 INDOOR UNITS |
5 VENTILATION UNITS
FIFTH FLOOR
0 INDOOR UNIT |
LECTURE ROOM
20 INDOOR UNITS |
262
20 INDOOR UNITS |
5 VENTILATION UNITS
SELECTION RELEASE
262-1

Fig. 12 c

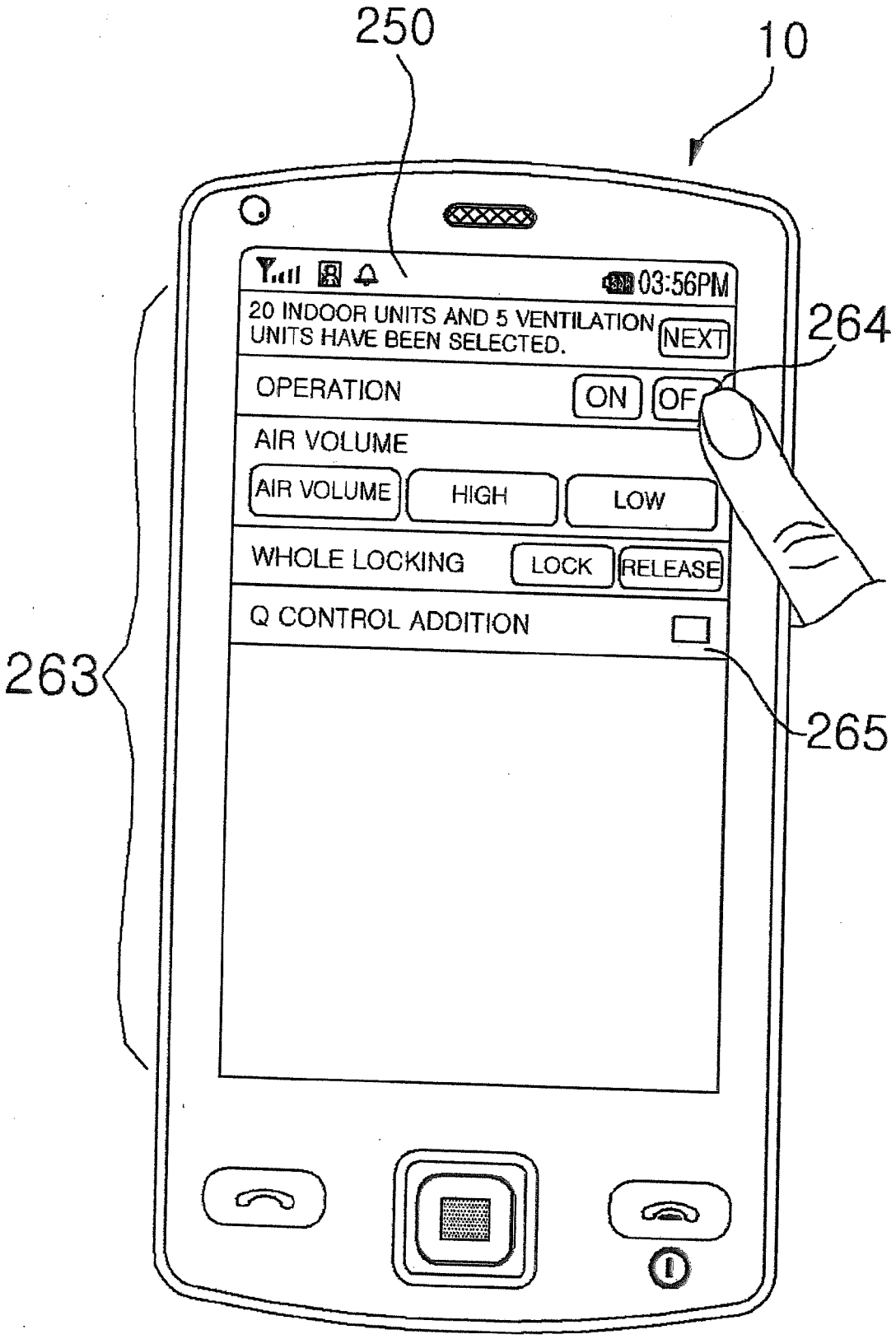

250
10
03:56PM
20 INDOOR UNITS AND 5 VENTILATION UNITS HAVE BEEN SELECTED.
NEXT
264
OPERATION
ON
OF
AIR VOLUME
AIR VOLUME
HIGH
LOW
WHOLE LOCKING
LOCK
RELEASE
Q CONTROL ADDITION
263
265

Fig. 12d

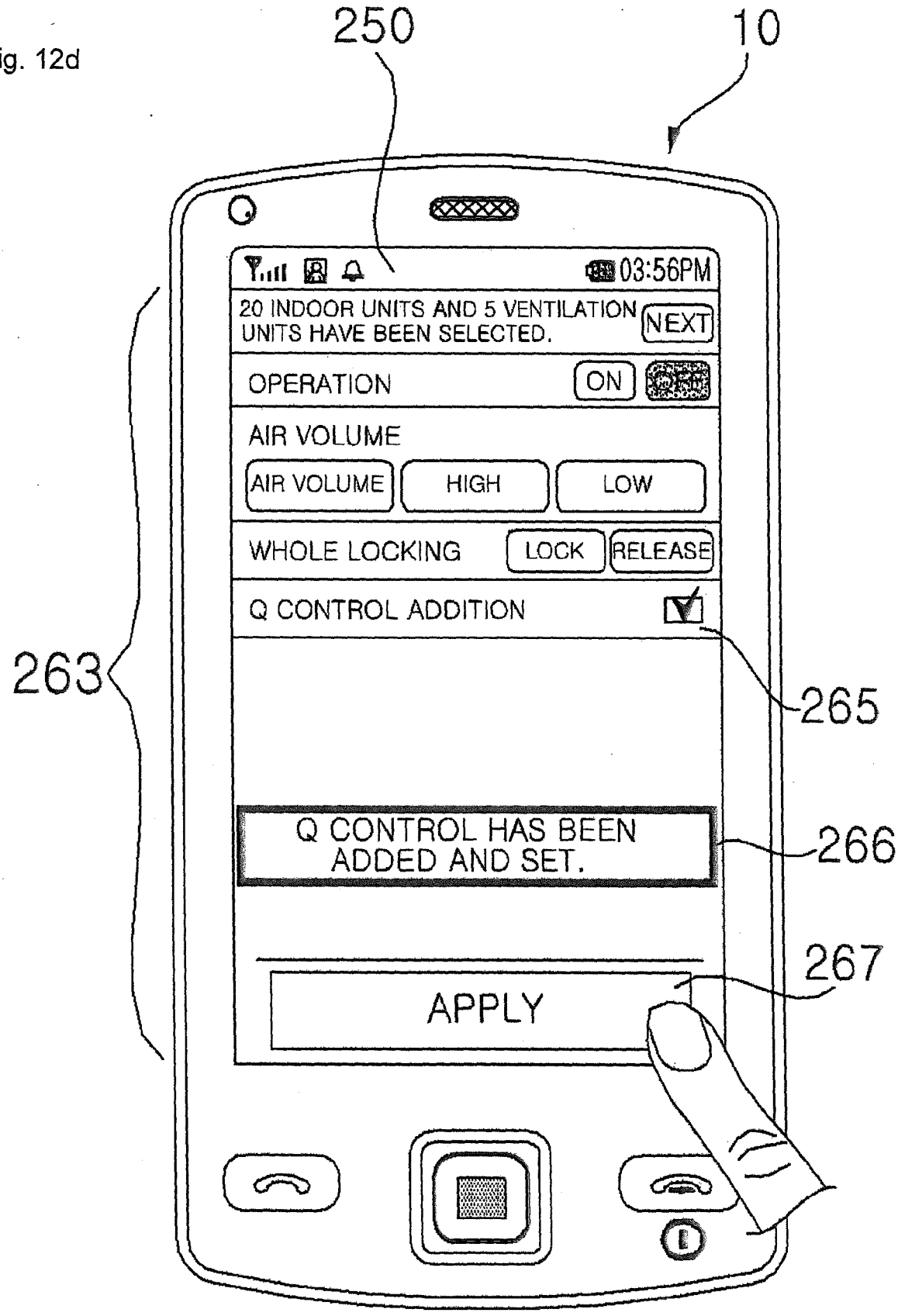

250
10
03:56PM
20 INDOOR UNITS AND 5 VENTILATION UNITS HAVE BEEN SELECTED.
NEXT
OPERATION
ON
OFF
AIR VOLUME
AIR VOLUME
HIGH
LOW
WHOLE LOCKING
LOCK
RELEASE
Q CONTROL ADDITION
263
265
Q CONTROL HAS BEEN ADDED AND SET.
266
267
APPLY

Fig. 12e

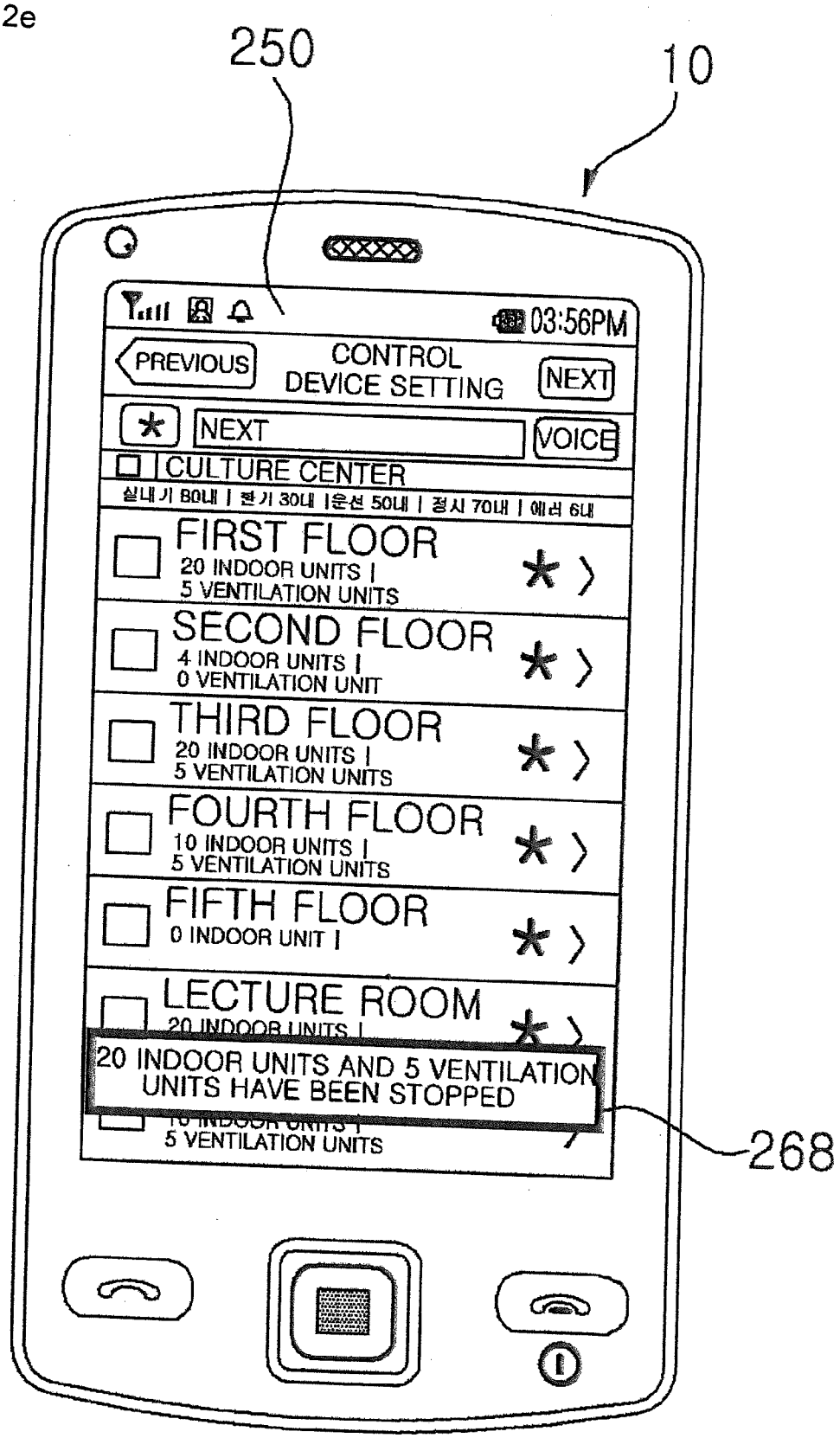
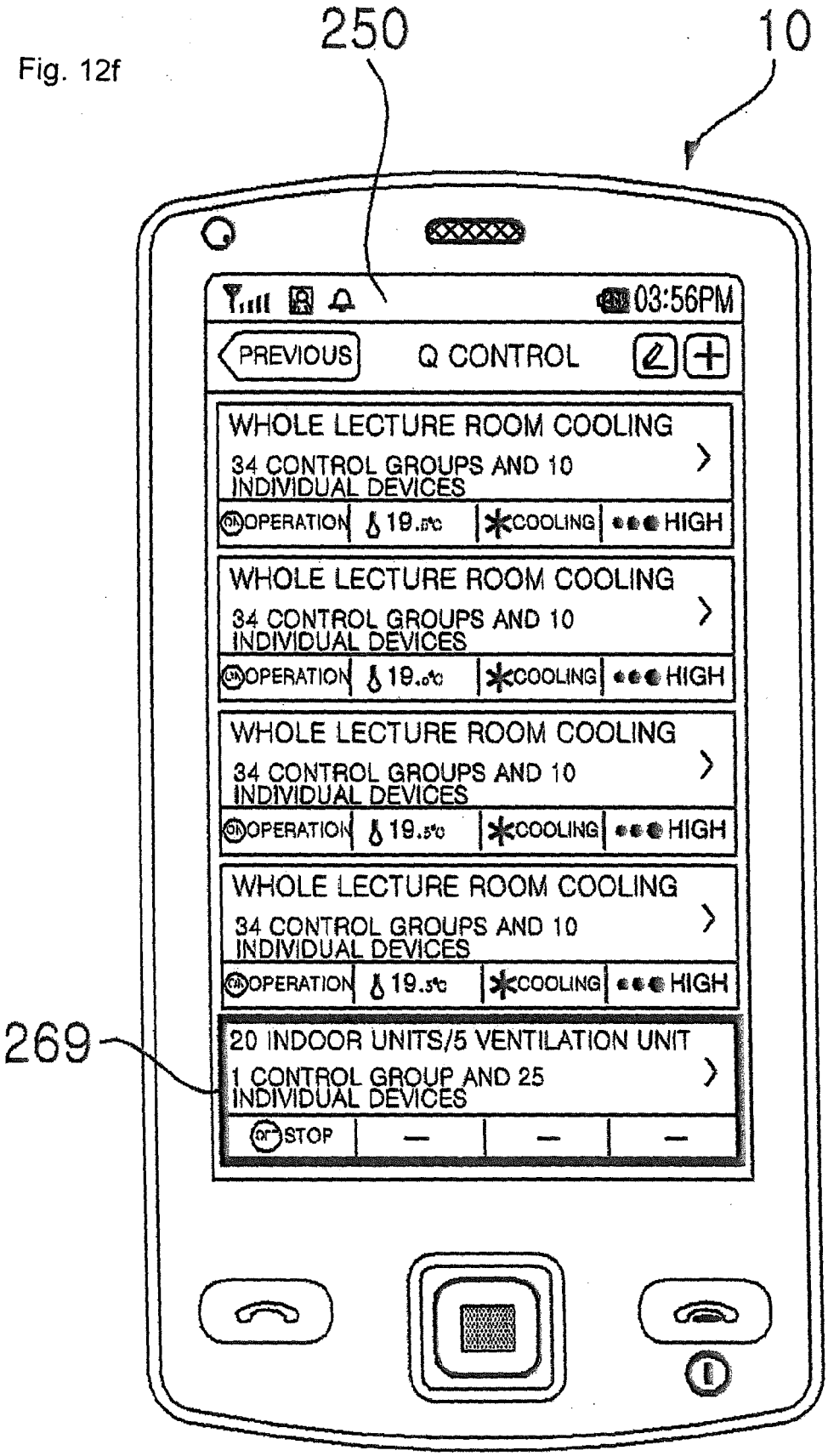

250
10
03:56PM
PREVIOUS
CONTROL DEVICE SETTING
NEXT
NEXT
VOICE
CULTURE CENTER
실내기 80내 | 분기 30내 | 운선 50내 | 정시 70내 | 에러 6내
FIRST FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
SECOND FLOOR
4 INDOOR UNITS |
0 VENTILATION UNIT
THIRD FLOOR
20 INDOOR UNITS |
5 VENTILATION UNITS
FOURTH FLOOR
10 INDOOR UNITS |
5 VENTILATION UNITS
FIFTH FLOOR
0 INDOOR UNIT |
LECTURE ROOM
20 INDOOR UNITS AND 5 VENTILATION UNITS HAVE BEEN STOPPED
5 VENTILATION UNITS
268

Fig. 12f


250
10
03:56PM
PREVIOUS
Q CONTROL
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
19.5°C
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
19.0°C
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
19.5°C
COOLING
HIGH
WHOLE LECTURE ROOM COOLING
34 CONTROL GROUPS AND 10 INDIVIDUAL DEVICES
ON OPERATION
19.5°C
COOLING
HIGH
269
20 INDOOR UNITS/5 VENTILATION UNIT
1 CONTROL GROUP AND 25 INDIVIDUAL DEVICES
OFF STOP
—
—
—

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EUROPEAN SEARCH REPORT

Application Number
EP 14 17 7952

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2002/029096 A1 (TAKAI TADASHI [JP] ET AL) 7 March 2002 (2002-03-07) * paragraph [0006] - paragraph [0015] * * paragraph [0025] - paragraph [0048] * * figures *	1-15	INV. F24F11/00 H02J13/00 H04N21/41
X	EP 2 093 510 A1 (MITSUBISHI HEAVY IND LTD [JP]) 26 August 2009 (2009-08-26) * paragraph [0028] - paragraph [0065] * * figures *	1,10	
X	EP 2 056 032 A1 (LG ELECTRONICS INC [KR]) 6 May 2009 (2009-05-06) * paragraph [0016] - paragraph [0041] * * figures *	1,10	
A	EP 1 335 166 A2 (MITSUBISHI ELECTRIC CORP [JP]) 13 August 2003 (2003-08-13) * paragraph [0055] - paragraph [0088] * * figures *	1	
A	EP 2 455 677 A1 (MITSUBISHI HEAVY IND LTD [JP]) 23 May 2012 (2012-05-23) * abstract; figures *	1	TECHNICAL FIELDS SEARCHED (IPC) F24F H02J H04N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 November 2014	Mattias Grenbäck

CATEGORY OF CITED DOCUMENTS

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13-11-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002029096 A1	07-03-2002	US 2002029096 A1	07-03-2002
		US 2004049320 A1	11-03-2004
EP 2093510 A1	26-08-2009	CN 101520655 A	02-09-2009
		EP 2093510 A1	26-08-2009
		JP 5001876 B2	15-08-2012
		JP 2009198149 A	03-09-2009
EP 2056032 A1	06-05-2009	EP 2056032 A1	06-05-2009
		ES 2379958 T3	07-05-2012
EP 1335166 A2	13-08-2003	EP 1335166 A2	13-08-2003
		EP 2119975 A1	18-11-2009
		EP 2119976 A1	18-11-2009
		US 2003140637 A1	31-07-2003
		US 2006026972 A1	09-02-2006
EP 2455677 A1	23-05-2012	EP 2455677 A1	23-05-2012
		JP 5285522 B2	11-09-2013
		JP 2011021801 A	03-02-2011
		WO 2011007629 A1	20-01-2011

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